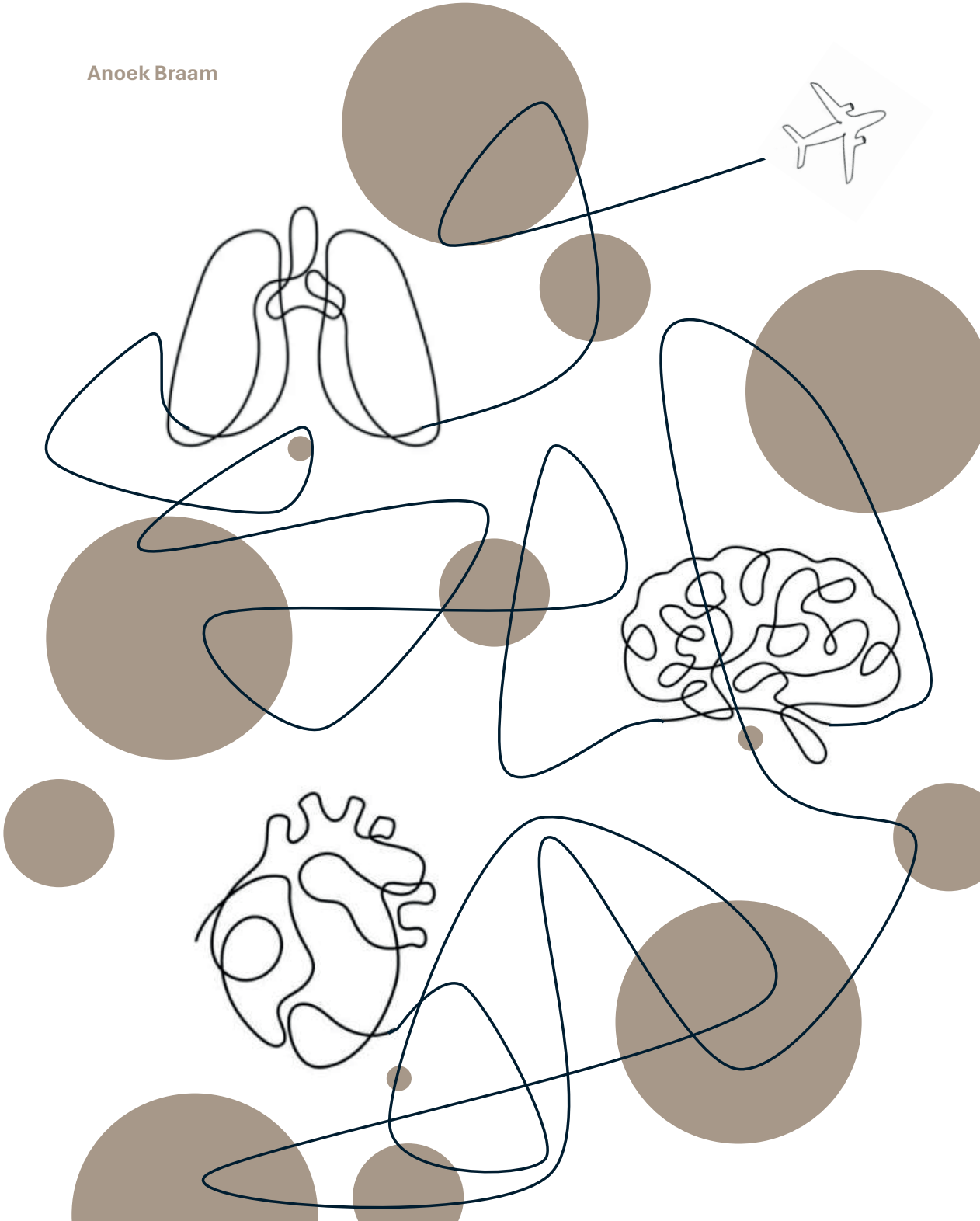
Beyond Boundaries of Specialty

The role of clinical leadership and hospital structures in the collaboration of physicians from different specialties

Anoek Braam



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Beyond Boundaries of Specialty

The role of clinical leadership and hospital structures in the collaboration of physicians from different specialties.

De grenzen van het specialisme voorbij

De rol van klinisch leiderschap en ziekenhuisstructuren in samenwerking tussen artsen van verschillende specialismen.

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1

GENERAL INTRODUCTION

HEALTHCARE'S NEED FOR CHANGE: THE ROLE OF HOSPITALS AND PHYSICIANS.

By 2025, medical specialists will be more involved with patients in conceiving, developing, and evaluating innovations within healthcare. Hospital organizations are focused on helping to further develop and implement these innovations.

– Federatie Medisch Specialisten, 2017 [1]

Leading hospitals play an active role in helping public administration and society deal with the health care economics challenge, bringing vision and knowledge to the debate on the configuration of the future healthcare system.

- IESE Center for Research in Healthcare Innovation Management, 2016 [2]

The above quotes from reports of the Dutch Association of Medical Specialists (Federatie Medisch Specialisten) and the IESE Center for Research in Healthcare Innovation Management illustrate that hospitals as well as medical specialists play a key role in the changes needed to meet the challenges the healthcare system is facing. Life expectancy has increased by more than 6 years over the period from 2000 to 2019.[3] This increase reflects improvements in healthcare such as growing medical knowledge and technological innovations, improved living standards, and other factors that contribute to increased longevity.[3] As life expectancy increases we see an ageing population accompanied by an increase in demand for care and an increase in the prevalence of multimorbidity, defined as the co-existence of two or more chronic conditions in a patient.[4–8] In the Netherlands, we see the following figures regarding percentages of the population with multiple chronic conditions: 2001 – 14.3%, 2011 – 17.5%, 2021 – 32%.[9,10] Having multiple conditions is often associated with complex care, multiple treatments, polypharmacy, and fragmented specialist visits.[5–8,11] In addition, as patients are becoming more informed about their rights, their expectations with regard to healthcare services have significantly increased. [1,12] Patients demand better and more patient-centered healthcare services. To prevent healthcare costs skyrocketing, there is also financial pressure on healthcare.[13,14] All in all, health care organizations are expected to provide more, better, and more patient-centered healthcare services with the same or fewer resources. Current characteristics of the healthcare system do not appear to be adequality developed to meet these challenges and change is required to keep healthcare accessible, affordable, and of high quality.[7,15,16]

Integration and coordination are prioritized themes in addressing healthcare challenges. Although integration (inclusion of individuals from separate groups as equals) and coordination (process of organizing people to work well together) are described differently in the dictionary, they are often used to describe similar developments in healthcare. Developments aimed to address fragmentation.[17–19] These developments are required at multiple levels. For example, at the regional level in the form of organizations working in healthcare networks: regional groups of healthcare providers offering differentiated ranges of services in a coordinated manner. Developments are required at the team level as well, in the form of multidisciplinary collaboration between physicians, nurses, and allied health professionals organized around patient's needs, or in the form of inter-physician collaboration: physicians from different medical specialties that exchange knowledge and skills to provide complex care. In the Netherlands, key partners such as the Ministry of Public Health, Welfare, and Sports, the Dutch (Ministerie van Volksgezondheid, Welzijn, en Sport) association of hospitals, health insurers, and the FMS, made agreements (Hoofdlijnenakkoord Medisch Specialistische Zorg 2019-2022, and more recently Integraal Zorgakkoord) to encourage an integral approach.[13,14] In both agreements, there is a clear focus on **working together** to maintain quality, affordability, and accessibility of care. For example, by committing to more collaboration in the region, encouraging collaboration between the social domain, general practitioners, and mental health services, and between different types of professionals in healthcare. Much research has been conducted on different types of collaboration (e.g., van der Schors, Roos, & Varkevisser, 2020 [20]; Aunger, Millar, Greenhalgh, Mannion, Rafferty, & McLeod, 2021- [21]; Simons, Goossens, & Nies, 2022 [22]). Less attention though, has been paid in scientific literature to collaboration between different medical specialties. Physicians are often studied as if they represent a single unified group. While multi-specialty collaboration is crucial in delivering care for the increasing group of patients that suffer from multi-morbidity, it remains challenging as hospitals are still based on a single-disease paradigm.[2,16] Medical knowledge, medical education, medical quality control, medical research, and hospital structures are (still) mainly focused on sub specialization in single diseases.[7,16,23] It is therefore highly relevant for the steps towards integration of care to study inter-physician collaboration and how hospitals shape organizational structures to support this.

Hospital Development

Hospitals have existed for many centuries and have evolved over time. The idea of providing care to those in need, regardless of their social status or ability to pay, was at the heart of the early development of hospitals.[24] Although hospitals have always been a place to provide all sick people with affordable care, hospitals have evolved over time and are now sophisticated centers for diagnosis, treatment, and care. An important

change in the past has been the introduction of specialized departments (e.g. cardiology, neurology, …).[24] Focusing on a specific medical field enabled them to provide specialized care, develop new medical technologies and treatments, and provide specialized education to health professionals.[15,24,25]

Hospital structures were built in line with these specialized departments centered around medical disciplines, a so-called functional design. Within a functional design, healthcare professionals from a medical discipline are grouped into organizational departments.[25] Although these structures have proven their added value in the past, they are now being criticized. They receive criticism for not being able to respond to the multidisciplinary healthcare demands due to their focus on medical specialties and lack of integration.[15,26] Some researchers even argue that these functional designs impede coordination between medical disciplines, hamper efficiency, and are not suitable for providing patient-centered care.[27] In response to this criticism, we see hospitals being encouraged and taking steps towards structuring around medical conditions, so-called process-oriented, thematic, or care-focused designs.[15,28]

A process-oriented design is one built around the needs of the patient and includes all the medical specialties and healthcare professional who play a role in a patient's care pathway. These kinds of designs are expected to match existing challenges by increasing quality of care, improving patient-centeredness, and reducing costs.[16,29,30] The pioneering, and most well-known in Europe, example of a hospital choosing for a fundamental redesign towards a process-orientation is the Karolinska Institute in Sweden. They redesigned their structure by identifying the patient flow of patient groups with similar medical conditions and organizing them into seven themes (e.g. cancer, ageing, heart and vascular) with an addition of five functions that cut across these themes (e.g. radiology and imaging, emergency medicine) to streamline the delivery of care by aligning resources and expertise alongside the patient's journey, rather than with traditional departmental silos.[31] News reports give reason to assume that such changes are also being implemented in the Netherlands, but it is unknown how, and how many Dutch hospitals are working towards the introduction of process-oriented structures.[32,33]

Physicians' roles in future healthcare

The previous section emphasizes the expectation for hospital organizations to support multidisciplinary collaboration between healthcare professionals. Our introductory quote highlights a key player in this dynamic: **the physician.** Historically, physicians have held an elite and privileged status in society, characterized by specialized knowledge, professional autonomy, and self-regulation.[34,35] The medical profession was viewed a *pure* profession, similar to lawyers, accountants, and judges. However, chang-

ing patient demands and the public demand for transparency are forcing professionals to adapt to the evolving organizational and social context. The concept of a pure profession is no longer reflected in daily practice.[34] Physicians are often required to adapt, by incorporating new logics into the professional logic of medical specialists, described in literature as *hybrid professionalism* or *organized professionalism.*[34] In these new professional logics, traditional professional principles such as autonomy and control are combined with managerial principles such as quality and efficiency. These transitions in medical professionalism usually ascribed to increased external pressures from management, the public, or the government. However, they are now embraced by physicians themselves as well as illustrated in their view on the role of the medical specialist in 2025.[1] From 2025 onwards, even more than now, physicians need to be able and willing to collaborate with other healthcare professionals and be involved in innovation.[1]

Thus, physicians nowadays are expected to do more than just treating patients.[36] They must adjust their practice and incorporate inter-professional and cross-disciplinary collaboration as well as leadership into their professional role.[37,38] They are accountable for setting up and implementing innovation projects and aligning decisions with managerial logics (e.g., scarce capacity, financial constraints). Physicians are expected to be at the forefront of the changes needed in healthcare.

Part of the new role: collaboration

The current healthcare system (e.g., education, quality inspection, reimbursement of care) is still largely based on a single-disease paradigm, while complexity of care due to high frequency of multimorbidity requires an integrated approach involving multiple specialties.[39,40] Therefore, to provide diagnoses and treatment for complex patients, medical knowledge from different disciplines is needed, which requires collaboration between physicians from different medical specialties.

Starting from a common medical education program, and subsequently shaped by their specialty, physicians develop different professional identities, influenced by the behavior of peers and superiors, and by the unique cultures of their respective specialties.[7,8,16,41] These shaped identities create interprofessional differences, such as different views on how to best treat a patient and differing communication preferences, that can complicate collaboration.[42,43] In addition collaboration between specialties can be complicated by geographical fragmentation, non-supportive organizational arrangements for multidisciplinary consultation, role conflict due to overlapping roles and responsibilities, and a lack of well-established relationships.[42,43] Despite the increased importance of inter-physician collaboration in the complex hospital environment an

overview on collaboration between physicians from different medical specialties is lacking and little is known about inter-physician collaboration in general.

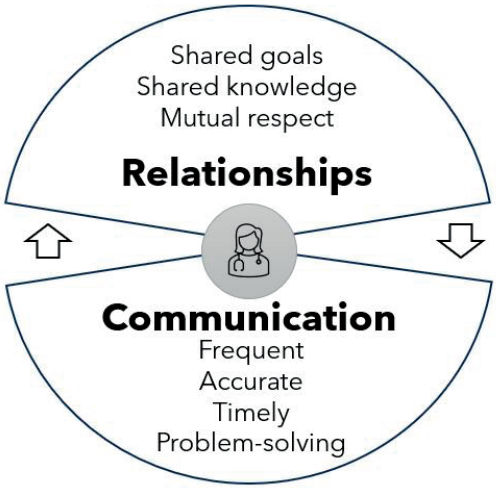

Figure 1.1. Relational Coordination. The mutually re-inforcing process of communication and relationshipsbetween physicians.

Relational coordination is a well-known concept that can be used to map collaboration on different levels. Relational coordination is a concept that originated in organizational theory and can be described as a mutually reinforcing process between quality of communication and relationships.[44] According to the theory (Figure 1.1), successful coordination is characterized by timely, frequent, accurate, and problem-solving communication between two parties supported by relationships of shared knowledge, shared goals, and mutual respect. Vice versa relationships are strengthened by effective communication.[45] Given the challenges regarding multimorbid patients, and the subsequent necessity for collaboration between physicians, we determine relational coordination to be a highly relevant concept for our research.

Part of the new role: clinical leadership

We have already stressed that healthcare professionals are expected to take the initiative to increase integration in healthcare. In literature, this role is most often described as a clinical leadership role, and it is stressed that this role may be fulfilled by any healthcare professional involved in direct clinical care.[37,38,46] Clinical leaders are role models by being supportive, accessible, and effective communicators, motivators and mentors for others.[38,46–49] Furthermore, they should also be visible in clinical practice and have values and beliefs regarding excellence and quality.[38,46] Partly because of this, it is often seen as an informal leadership role that may be taken on without having to hold a

formal leadership position. These clinical leaders are expected to negotiate care plans, balance diverging perspectives in multispecialty teams, and thereby bridge specialist boundaries to provide continuity of care for patients with comorbidities.[38,46,48] Clinical leadership as a catalysator for interdisciplinary collaboration has, however, received little attention.

Research aim

Today's comorbid patients are driving the need for enhanced collaboration between physicians. Such collaboration is crucial to provide the high-quality care that comorbid patients require. In addition, collaboration should lead to less fragmentation. Reducing fragmentation should ensure coordinated and comprehensive care, leading to better patient outcomes. Ultimately, it should contribute to high quality care that is both affordable and accessible to everyone. The aim of this thesis is to better understand the role of physicians and hospitals' efforts to reduce care fragmentation within hospitals by studying inter-physician collaboration. We study inter-physician collaboration in combination with the new role of physicians as clinical leaders and organizational changes within hospitals. The central research question is:

How do clinical leadership and organizational changes within hospitals contribute to inter-physician collaboration?

The research aim is divided into the following sub-research questions:

- How are hospital designs evolving in the current context to support inter-physician collaboration?
- What is the state of the art for academic literature on collaboration between physicians from different medical specialties in a hospital setting?
- How do clinical leadership behaviors correlate with multidisciplinary collaborative behaviors?
- What associations exist between clinical leadership, relationships between physicians, and outcomes such as job-satisfaction and physicians' reported quality of care?
- How does organizational change impact multidisciplinary collaboration and perceived impact in terms of efficiency, innovation, and effectiveness?

The Dutch Healthcare Sector

This study was carried out in the context of the Dutch healthcare sector. The Dutch healthcare sector has similarities with healthcare in other top-ranking western countries such as the United Kingdom (UK) and Scandinavian countries (Norway, Sweden).[50] They all encounter threats such as unhealthy lifestyles, an ageing population, and increased prevalence of multimorbidity. Furthermore, they are being steered by managerial and market logics that aim to increase cost containment and performance management.[51,52] Another similarity is that it is common in the United Kingdom, Scandinavian countries, and the Netherlands to visit a general practitioner for a referral to the hospital to receive specialist care.[53]

Given the similarities in both the organization of care and the challenges faced, it is not surprising that there is an overlap in the strategies to improve care. The National Health Service (NHS) in the UK is emphasising integration, where new structures should emphasize openness and collaboration rather than competition.[54] Scandinavian countries also attach importance to networks of healthcare professionals with a focus on preventative care.[55] In the Netherlands, similar plans are described in the *Integraal Zorgakkoord (Integral Healthcare Agreement),* based on the concept of *passende zorg (appropriate care).* It describes how healthcare professionals, healthcare organisations and other involved stakeholder in the Netherlands should work on improving coordination of care, promotion of collaboration between healthcare providers, and increase emphasis on prevention and value-driven care. Among other things, these plans focus on regional and local collaboration between professionals supported by appropriate structures, on health and quality of life instead of disease and medication, and on preventative care to reduce or prevent care needs. All to keep care accessible, of good quality, and affordable.[56] This has led to several trends in Dutch healthcare e.g.: attention for shared decision making, digital care, and the right care in the right place. The latter has been translated in practice by moving care from the medical specialist to physician assistants, general practitioners, other institutions, and the home (using e-health), to reduce costs and maintain hospital capacity for complex patient.[57]

In several countries (e.g., UK, Canada, Australia, Scandinavian countries) agreements are concluded between different healthcare stakeholders to improve care, control costs and increase access to care. Although such agreements are not unique, the form it takes in each country is specific, based on the specific needs, structures, and characteristics of the healthcare system in that country. The initiatives towards integrated care in the Netherlands have come together in the *Integraal Zorgakkoord.* In the Netherlands, we must consider that the healthcare system is characterised by regulated competition, meaning that health insurers negotiate with healthcare providers on the price and

quality of care while the government monitors affordability and accessibility.[56] Another issue to consider is that compared to physicians working in hospitals in other European countries, the physicians in the Netherlands hold a relatively strong position, characterised by a high amount of autonomy over their clinical work and salary.[35] This strong position is partially caused by the fact that only about 35% of all physicians in general hospitals are employed by the hospital while about 65% are self-employed.[58] In practice, this means that there are hurdles in getting physicians to accept the market- and managerial logics of the hospital management. In addition to the physicians' strong position, there is also an increasing focus in the Dutch hospital sector on the leadership role of nurses and other healthcare professionals. Partly due to the creation of a law stipulating that a healthcare organisation must give healthcare professionals the opportunity to influence policy when important to provide good care.[59] For nurses, this is done through the appointment of a nursing staff board in more and more hospitals, giving nurses a managerial voice.[60] Amid current labor shortages in healthcare, nursing leadership is argued to be essential for creating a positive work environment that helps retain nurses.[61] Combined this has led to a growth in research on nursing leadership.

Outline of the research project

The described transitions and trends show a shift in Dutch healthcare towards integration of care and leadership of physicians and nurses. Physicians and nurses are expected to provide safe and high-quality care – the core of the medical professional role – but are also increasingly expected to put effort into collaborative relationships with other healthcare professionals, as well as management. This makes the Dutch healthcare sector an interesting context to research how leadership and organizational changes contribute to collaboration between physicians from different disciplines. The subsequent chapters delve deeper into the role of leadership and organizational change in fostering effective collaboration within the Dutch healthcare sector.

First, **chapter 2** will outline the development of Dutch hospitals structures towards process-oriented hospital structures using multiple qualitative methods. A typology to categorize all Dutch general hospitals will be developed by studying the organizational charts and annual report available through hospital websites. Additionally, hospitals managers and staff will be interviewed to understand how hospital designs are currently developing and what the driving forces behind these developments are. By conducting the study described in chapter 2, this thesis aims to provide insight into the development of Dutch hospital structures and answers the first sub-question of this thesis: *How are hospital designs evolving in the current context to support inter-physician collaboration?*

Second, **chapter 3** will present a systematic review of scientific literature with the aim of providing an overview of academic literature on inter-physician collaboration and answer the second sub-question of this thesis: *What is the state of the art for academic literature on collaboration between physicians from different medical specialties in a hospital setting*. This review will focus on investigating what factors affect inter-physician collaboration, how inter-physician collaboration is measured, and will determine the effects of inter-physician collaboration. Given that attention to interprofessional collaboration in healthcare often focuses on collaboration between physicians and other health professionals, this review addresses the gap in literature and will provide an overview of collaboration between physicians from different medical specialties. This is crucial because providing care for patients with comorbidities inevitably requires collaboration between physicians from different medical specialties.

Third, we will present a cross-sectional study on similarities and differences between nurses' and physicians' clinical leadership behaviors in **chapter 4.** Since both healthcare professionals' roles in today's complex healthcare involves more than just being responsible for the provision of care, we aim to describe healthcare professionals' clinical leadership roles within a hospital context and explore how these roles relate to the necessary collaborative behaviors. Clinical leadership behaviors will be studies as provision of direction and support to patients and healthcare professionals in the delivery of patient care. We will discuss if these behaviors form an effective strategy to build bridges and encourage healthcare professionals to change, aiming to answer the third sub-question of this thesis: *How do clinical leadership behaviors correlate with multidisciplinary collaborative behaviors?*

Fourth, **chapter 5** will expand on the research presented in chapter 4 and aims to explain the relation between physicians' clinical leadership and outcomes in terms of job satisfaction and physicians reported quality of care. This will focus on the relationships with physicians from their own medical specialty and from other specialties, as reflected by relational coordination. This cross-sectional study aims to answer the fourth sub-question of this thesis: *What associations exist between clinical leadership, relationships between physicians, and outcomes such as job satisfaction and physicians' reported quality of care?* This should also contribute to the discussion whether no longer organizing care around medical specialties has potential for improvement of care quality or if organizing around medical specialties is still valuable.

Fifth, we will present a survey-based longitudinal evaluation study in **chapter 6**. This study, which will combine quantitative and qualitative responses to survey-questions, aims to answer whether the development of hospital structures leads to multidisciplinary collaboration and perceived impacts such as efficiency, innovation, and effectiveness. Furthermore, it aims to study whether there are differences between specific introduced units (patient- and process-oriented units) to answer the final sub-question of this thesis: *How does organizational change impact multidisciplinary collaboration and perceived impact in terms of efficiency, innovation, and effectiveness?*

Finally, **chapter 7** will present a conclusion and discussion of the overall findings in relation to literature, trends in healthcare, and practice. It will also reflect on the research methodology, the physicians as an interesting professional group, and conclude with implications and suggestions for future research.

2

DEVELOPMENT OF HOSPITAL DESIGNS

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ABSTRACT

Hospitals have been encouraged to develop more process-oriented designs, structured around patient needs, to better deal with patients suffering from multi-morbidity. However, most hospitals still have traditional designs built around medical specialties. We aimed to understand how hospital designs are currently developing and what the important drivers are. We built a typology to categorize all Dutch general hospitals (61), and we interviewed hospital managers and staff. The inventory showed three types of hospital building blocks: units built around specific medical specialties, clusters housing different medical specialty units, and centers; multi-specialty entities provide the most suitable structure for a process-oriented approach. Only some Dutch hospitals (5) are mainly designed around centers. However, most hospitals are slowly developing towards hybrid designs. Competitive drivers are not important for stimulating these redesigns. Institutional pressures from within the health care sector and institutional 'mimicking' are the main drivers, but the specific path they take is dependent on their 'heritage'. We found that hospital structures are more the result of incremental, path-dependent choices than 'grand-designs'. Although the majority of the Dutch general hospitals still have a general design built around medical specialties, most hospitals are moving towards a more process-oriented design.

INTRODUCTION

Since the beginning of this century, hospitals have been encouraged to redesign and develop more process-oriented structures.[15,28] In a process-based organization design, the structure is built around patient needs, in which multi-disciplinary organizational departments (including multiple medical specialties) can each handle all the needs for specific patient groups, with few interdependencies between departments.[26,28] This seems especially important as the number of patients with multi-morbidity, especially multiple chronic diseases, is rising fast in many countries.[7] In general, such designs are expected to increase the quality of care and reduce costs, for which there is some evidence, and to improve patient-centered care.[25,26] However, in practice only a few hospitals have up till now opted for such a redesign; most hospitals still have a more traditional structure built around medical specialties.[25]

In this study, we therefore aim to understand how hospital designs (organizational structures) are currently developing and what the drivers are behind these developments. We chose to perform this study in one country: the Netherlands. Although this does not allow us to study the influences of different systems, it does give us more opportunity to understand why different structures develop even when the contextual conditions are partly the same.

Hospital Designs and Interdependencies

More traditional hospitals have a so-called functional design in which people with similar expertise or knowledge are grouped in organizational departments, mostly built around medical specialties, such as neurology.[25] However, as patients often rely on the expertise from different departments and specialties, interdependencies become difficult to manage. Both sequential (process) and reciprocal interdependencies play a role.[62,63] Sequential refers to the fact that during the course of their disease and treatment patients sequentially require help from different departments (as well as professionals and specialties), going, for example, first to the emergency department and then to the OR and ICU and then a medical ward (the output of one department (specialty) is the input for another; this is a (mostly) one-way street).[62,63] Reciprocal dependencies relate to the fact that patients may require the help of different medical departments (professionals or specialties) during the same phase of their disease trajectory, because of multi-morbidity for example (both the output and the input of each specialist are interdependent: a two-way street).[62,63] As the number of patients with multi-morbidity is rising fast, reciprocal interdependencies, especially between different medical specialties, are increasing in hospitals [4]. By creating so called clinical institutes, hospitals have tried to deal with these interdependencies.[64] Clinical institute designs organize

services around patient conditions, such as cancer services and cardiothoracic care.[64] However, such a design often requires a major organizational restructuring. According to Vera and Kuntz,[26] organizational restructuring is not the only path towards a more process-oriented structure; another option is to implement coordination mechanisms within existing structures (e.g., multi-disciplinary meetings and standardized care pathways).

Drivers for Organizational Change

The structural choices that organizations make are at least partly based on their strategies. Although the adage 'structure follows strategy' has long been falsified and structures also develop through incremental decisions and changes, strategy and structure do influence each other.[65,66] Paauwe and Farndale[67] developed a framework to understand how organizational choices (about structures for example) are shaped by different drivers, namely institutional pressures, competitive drivers, and historically grown configurations.[68,69] First, organizational choices are subject to institutional pressures and the rules, norms, or values that are prevalent in the sector. In order to gain legitimacy and improve their chances of survival, organizations will conform to these "rules of the game".[67–70] Second, competitive mechanisms influence organizational choices. In order to gain competitive advantage, organizations are driven to optimize effectiveness and efficiency.[67–69] Third, organizations are influenced by their own heritage. Historically grown configurations, based on past choices silicified in structures, roles, competences, and values, may form path-dependent patterns for future choices.[67–69] These three drivers shape the perceptions of those individuals with decision-making power, the dominant coalition, of the room they have to maneuver in and make specific choices. These drivers may therefore help us better understand why hospitals opt for specific designs.

MATERIALS AND METHODS

Setting: The Dutch Hospital Sector

Dutch hospitals are mostly private, not-for-profit organizations, with a few exceptions. In 2019, there were 69 hospital organizations, with 116 hospital locations.[71] These 69 hospitals include eight university medical centers and 61 general hospitals. On average, a Dutch hospital organization has 450 beds.[71] In general hospitals, about 65% of the doctors are part of an independent medical specialist group (mostly based on specialty); 35% are employed and salaried (especially younger medical specialties such as geriatrics and intensivist and emergency physicians).[72] Since 2015, these independent medical specialist groups have needed to negotiate their payment with the hospitals;

before 2015, they negotiated independently with the insurers who act as health care purchasers in the Dutch system.[73] Therefore, in each hospital medical specialist groups now form a Medical Specialist Company together. Employed medical specialists are organized in many hospitals in an Association of Employed Medical Specialists. In many hospitals, specialists have chosen to unify their representation towards the board of directors by creating an Association of (all) Medical Specialists, which works in close cooperation with the hospital's board of directors.

The Netherlands has a market-based system in which private, statutory insurers are responsible for the strategic purchasing of care for their clients. The insurers negotiate with hospitals over prices, quality, and volumes.[73] Purchasing health insurance from a private health insurer is obligatory for all residents in the Netherlands. Payment for hospitals is mostly based on a Dutch version of the diagnosis-related group approach. Hospitals are expected to compete on both quality and costs. The national government sets overall priorities for health care and monitors access, quality, and costs.[73] Every four years since 2012, the ministry of health has initiated an agreement with, among others, the Dutch Medical Association, the Dutch Association for Health Insurers, and the Dutch Association for hospitals about costs and quality. All of these agreements have put a cap on growth of expenses for specialist care. The 2019–2022 agreement states that in 2022 there should be a zero percent increase in expenses for specialist care.[74]

Research Design

In this study, we used multiple qualitative research methods to study the development of hospital designs in the Netherlands. The study consisted of two phases. In the first phase of the study, we tried to obtain a general overview of how the designs of Dutch hospitals vary by studying the annual reports and organization charts of all the Dutch general hospitals. The second phase of the study was the most important for answering our research question; we interviewed hospital managers and staff of a selected number of these hospitals to understand what the drivers are behind different hospital designs.

Phase 1

Data Collection

Between January and April 2019, five junior researchers visited the websites of all 61 Dutch general hospitals to acquire the annual reports and the organizational charts. If the organizational charts were not available online, they called the hospital to acquire them.

Data Analyses

The 61 general hospitals were divided between these five junior researchers, who each studied the relevant annual reports. Together, they presented all the organizational charts in one file and added relevant information from the annual reports. This file was analyzed by the first author to identify communalities and differences between hospitals in how the different medical specialties and professions were organized in departments to deal with sequential and reciprocal interdependencies. As the existing categorizations (e.g., traditional professional design versus clinical divisional and clinical institute directorates) did not capture the relevant variations we found, we decided to build a new categorization based on the data. The first author therefore developed a preliminary typology. This typology was discussed in several rounds with the other authors (the third author is a hospital director) until consensus was reached; this resulted in three basic types: unit, cluster, and center design. Based on this typology, the first and the second authors independently categorized each hospital. Some hospitals were difficult to categorize as the organizational charts were somewhat unclear because of the terminology used. As a consequence, the first and second authors categorized 12 hospitals differently: primarily into unit and cluster designs (there was only one center design, which was at that moment in transition, making the categorization difficult). Differences in opinion were discussed (using the charts and the annual reports) until consensus was reached.

Phase 2

Data Collection

The categorization in the first phase was used in the second and most important phase to select hospitals. From each category, we selected three to six hospitals. In our selection, we also took the variations within categories into account: for example, hybrid structures and geographical spread. In order to understand the rationale behind the hospital designs, semi-structured interviews were conducted by the second author. We interviewed (at least) two respondents from each hospital; all the respondents were familiar with the choices made about the structure. For each hospital, we contacted the secretary of the board of directors and asked his advice about who to interview. From November 2020 to March 2021, a total of 26 interviews with representatives from 12 hospitals were conducted, including members of the board of directors, members of the medical advisory board, and medical managers (see Table 2.1).

Table 2.1. Respondents

Hospital Type	Hospital	Function Respondents
Unit design	A	Chairman of the board of directors
	A	Urologist and project manager strategy
	B	Chairman of the medical staff association
	B	Pediatrician and secretary medical specialist company
	C	Secretary of the board of directors
	C	Secretary medical staff association
	D	Secretary of the board of directors
	D	Secretary medical staff association
	E	Secretary of the board of directors
	E	Chairman medical specialist company
	F	Chairman of the board of directors
	F	Manager of a staff department
	F	Gynecologist and chairman medical coordinators
Cluster design	G	Secretary of the board of directors
	G	Secretary medical staff association
	H	Secretary of the board of directors
	H	Manager human resources
	I	Secretary of the board of directors
	I	Manager strategy and sales
Center design	J	Secretary of the board of directors
	J	Chief medical department
	K	Secretary of the board of directors
	K	Business manager of a medical department
	K	Business manager of a medical department
	L	Secretary of the board of directors
	L	Business manager of a medical department

We developed an interview guide, partly based on our findings in the first phase of the data collection, to deepen our understanding of the hospital structure and its development and partly on the framework of Paauwe, to understand the drivers behind the choices made. The respondents were first asked to describe the structural design of their hospital in their own words; this was followed by more detailed questions about the structure. Then, we asked how this structure had developed over time and the reasons why. We also asked about other developments/projects within the hospital that

affected the structure. Subsequently, we discussed the different mechanisms from the Paauwe model; we asked about the influence of competition, stakeholders, population characteristics, and governmental regulations. We also asked about the influence of past strategic choices, existing structures, culture, and power distributions. Finally, we asked about the role of the dominant coalition in making choices related to the organizational structure. The first interviews were regarded as a pilot test (more than two interviews were conducted in this hospital). Only a few small changes were made to the guide based on this pilot test. Due to the COVID-19 pandemic, all the interviews were held via the online platform Microsoft Teams or by telephone. All the interviews were in Dutch. The relevant citations were translated to English for this paper.

Data Analyses

The interviews were audio-recorded and transcribed verbatim and analyzed. We used a combination of deductive and inductive approaches to analyze the data. First, the interviews were deductively labelled by the second author using the different drivers identified by the model of Paauwe. Second, open coding was used by the first author to analyze each of the drivers and the relationship between the drivers. This process was followed by axial coding; the codes were clustered thematically to identify patterns in the developments of the hospitals. These patterns were checked by the second author in the data. Then, these patterns were discussed and adapted by the first and second authors until consensus was reached.

Ethics

The Ethics Review Board confirmed that our study was outside the scope of the Netherlands' Medical Research Involving Human Subjects Act and that the rights and privacy of the study participants were sufficiently considered (METC-LDD-2019-Z19.0). All the respondents were asked for informed consent. All the data are stored and encrypted in a cloud server provided by our university and are only accessible by the authors of this paper.

RESULTS

Our inventory shows that there are three types of basic building blocks for Dutch general hospitals; **units, clusters, and centers**. **Units** are built around specific medical specialties, such as internal medicine, pulmonary medicine, gastrointestinal liver disease, dermatology, urology, neurology, neurosurgery, etc. These units are responsible for organizing both inpatient and outpatient care and have their own (specialist) nursing staff. In some hospitals, these units are the main building blocks and have a lot of

autonomy. **Clusters** are basically umbrellas under which different medical specialty units are housed. To allow the sharing of resources and stimulate cooperation, power is partly centralized from the unit level to the cluster level, although units still have a lot of autonomy. **Centers** are multi-specialty entities. In contrast to clusters, centers do not have separate specialty units within. Centers are often built around patient conditions, such as those for oncology and those for the elderly, the heart, etc., but they can also be based on care type, such as acute care, chronic care, and elective care. From our interviews, we learned that the choice to organize a center around a type of care relates to scale, as organizing all care around patient conditions would result in 'too many' (small) centers. The cluster design (37 of 61) is the most common in the Netherlands, followed by the unit design (19 of 61). Only a few hospitals (5 of 61) are designed around centers, although this design may be the best suited to introduce a process-oriented organization. However, there are hybrid forms, such as different hospitals (16) with primarily a unit or a cluster design but which also have one or a few centers, often focused on oncology, mother and child care, and/or heart–lung care.

Moreover, within all hospitals coordination mechanisms are (being) introduced so that they can become more process-oriented. For example, lean principles or value-based health care (VBHC) principles are in many hospitals used to build patient care pathways and introduce multi-disciplinary meetings between specialties. However, the scale and tempo in which these coordination mechanisms are introduced differs a lot between hospitals. We also see some hospitals that are introducing a matrix-like structure (in line with VBHC principles), in which the management of capacities (beds, OR, etc.) is separated from the management of patient trajectories.

During the interviews, we asked the respondents about the structural design of their hospital, how it developed, and what the main drivers were for the choices they made. Based on the model of Paauwe, we distinguish between competitive drivers, institutional pressures, organizational heritage, and the role of the dominant coalition.

Competitive Drivers

From the interviews, we learned that outperforming competitors and growth is not a driver for redesigning Dutch hospitals towards a more process-oriented structure. Because of the need for cost containment in the Dutch health system, the insurers, together with the Dutch government, have put a cap on growth. The hospitals are only allowed a growth in production of a few percent each year and budgets remain tight. As a consequence, in the Netherlands the smaller general hospitals in particular are and have been struggling for survival. That is why in recent years there have been many hospital mergers: 27 between 2008 and 2018.[75] Although these mergers required recon-

struction, most chose not to change the fundamental design (unit or cluster), as the integration would have taken up all of their energy. Currently, many hospitals are still dealing with the aftermath of these mergers and are therefore not willing to undertake major revisions.

> *"Much efforts have been spend to integrate specialty groups (e.g., groups of similar medical specialists (for example neurologists) from the different hospitals in the merger), mostly that has succeeded. But in some places you still see the remnants, which make you think they haven't really fallen into each other's arms yet, maybe on paper, but not in their culture, in the way they work nor in their views. So, within the different hospitals that have merged even specialists from the same discipline are not lined up yet".*

At the same time, a growing demand for care, together with the need for cost containment, also stimulates hospitals to think about more efficient and effective ways of organizing care. Currently, most Dutch general hospitals provide similar services. To increase efficiency and quality, insurers and the Dutch government are stimulating hospitals now to specialize more through, for example, selective contracting. As a result, however, many Dutch hospitals are not competing but increasingly working together to divide care delivery between them.

> *"What is interesting to mention is that I notice there is much mutual consultation between hospitals. I notice that we have many talks with the hospitals nearby on board level . . . do we need to make choices together about who does what? We concluded there are forms of basic care we all need to deliver. But some specialist care we can divide . . . .so how can we improve cooperation, in which each of us is not doing everything (perform all treatments)".*

Institutional Pressures

There seems to be a strong set of shared values within the Dutch hospital sector. All the respondents mentioned that they shared the ambition to work towards a more process-oriented structure and also the ambition to work more in regional networks with other care providers. However, they struggle with how to organize this. Different respondents referred to the Karolinska hospital in Sweden, which is one of the first hospitals which was completely restructured towards a clinical institute design, as an example or inspiration:

"We started work-conferences with our specialists, that's where we lay the foundation for thinking in terms of multi-disciplinary teams. It is also when we visited Karolinska".

Dutch hospitals also often look to each other for inspiration on how to work towards these ambitions:

"We looked at the outside world, how do others do this, . . . then you see slowly the development towards more care oriented, network oriented and matrix-like structures".

On the one hand, the sector is a strong reference point that inspires; on the other hand, existing structures and regulations within the sector are also seen as inhibiters. One of the respondents saw the current medical education of physicians as an important inhibiter because the students are mostly trained in the silo of a specific specialism and do not think in terms of multi-disciplinary care pathways:

"As long as we educate our medical students in the traditional specialist silo's . . . this mono-disciplinary focus will remain. I think it requires a few generations of medical students, to slowly develop towards care pathways".

Heritage

Different respondents stated that many characteristics of their current design were not so much driven by strategic choice but were the result of small pragmatic consecutive changes. Although the main design for a unit or cluster structure was a fundamental choice in the past (mostly more than 10 years ago), over time pragmatic choices were made to deal with new circumstances. Past choices and existing structures often guided future choices. One respondent gave an example of how the choice was made for the number of directors and therefore the number of departments:

"and again that is something that just came about, before we had four managers and we went back to three, I think it just depended on what talent is available and what works. You do not want too many directors, but also not too little".

Some respondents mentioned how sometimes pragmatic choices resulted in very illogical structures:

> *"When I came to work here, there where some, so to say, ridiculous combinations . . . What was the person thinking that put these units together, what is the logic behind this? And when I started asking, it was like . . . yea, that was all the one in charge could handle at the time, so this part needed to go and we just put it there".*

> *"they had this fun saying, about things that happened in the past. They said: this is hysterically grown".*

However, at the same time, these small consecutive steps can also be driven by strategic choices. In particular, when it comes to creating a more process-oriented structure, different respondents stated that it was mostly about seizing opportunities and gradual change, sometimes even covert actions.

> *"well we've been working on this for the past years, but more or less in an organic manner. Somebody retired, who was in charge of 3 units, and we took the opportunity to redistribute these units in a more sensible way . . . We are working towards what we call 'Patient Responsible Units' . . . clustered around themes (for example Chronic Care) . . . And we try to slowly build the portfolio's of our managers around those themes. So each manager will finally have two themes. And hey presto..surprise suddenly it is there".*

Most hospitals shy away from sudden major reforms and prefer a more incremental approach. Lack of stability was mentioned several times as a reason, because of past mergers (as discussed before) or financial instability:

> *"a couple of years ago we talked about the 'Karolinska model', you've probably heard of it . . . but these last years we had to cut back 30 million (euro's) without reduction in productivity. When you want to do something like that (restructuring) you need to let go of normal budgeting procedures and your organizational design. You need to change these, mess it all up, which is quite complicated. That is not something you can do when you're sailing close to the wind. So, we pushed that forward, although we are taking small steps".*

Another reason the respondents often referred to was that redesigns may harm the interests of doctors or, more specifically, some specialists, as a new structure will divide subspecialties between departments. That is why centers are often built around patient

groups that do not require the main specialisms involved (especially dominant specialisms) to be split up in different centers and where there is already a tradition of intensive multidisciplinary cooperation, such as oncology.

> *" . . . fear of losing influence and power. At the moment, specialisms have a strong mandate. So they have little to gain by doing things differently, So they resist; well some do . . . When your budget is divided between two Result Responsible Units or themes, then others control your income. And then you need to involve others in decision making".*

Dominant coalition

All the respondents referred to the board of directors together with the medical representatives as the dominant decision makers in the hospital. The hospitals that did make the decision to fundamentally redesign towards a more process-oriented structure all seemed to have a stable, visionary board of directors and strong, supportive medical representation. It seems that it takes a decisive and tenacious dominant coalition to successfully initiate and implement a redesign.

> *"So how did it all come about (the redesign towards a hospital build around centers), I think our director (a former medical specialist) was an important driver . . . she always said that it is important that medical specialists take the lead together with general managers in a hospital . . . In every hospital there is not a single line structure, but there is the hierarchical line and next to this the medical specialists with their own mandate, and this always creates a hassle . . . So I was very glad when . . . (name director) said, that we need to put specialists more in the lead".*

A number of respondents mentioned how their hospital was not ready for a major redesign towards a process-oriented structure, although they wanted to, because there was no stable board of directors:

> *"I think in that context, where we came from, there was momentum, in which we all thought we need to do something now with that philosophy (process-oriented), otherwise we will be ten years on. But we had a change in the board of directors and the interim director didn't want to turn things completely on its head. So, this was the most feasible solution".*

Additionally, other respondents mentioned that the representation of their doctors was fragmented and therefore somewhat rudderless, which slowed down or inhibited change.

" . . . when I was cluster-manager, when I wanted something I needed to visit all these groups (specialisms) and they all needed to agree. It was all very fragmented really and the medical staff was also somewhat rudderless, because they lacked a well-established structure for representation. So, he (the new director) said from the beginning, I want to govern together with the medical staff, but then I need one representative".

From the interviews, we learned that most of our hospitals are trying to work towards a more process-oriented approach, but mostly through incremental change and not through redesigning the main structure in one go. At the same time, our respondents in those hospitals that had redesigned their structure, mentioned they were still struggling to really change their way of working. Although the structural conditions have changed, underneath the old patterns still exist of specialisms that are used to working together and others that are hesitant to do so. Consequently, multi-disciplinary cooperation and patient pathways still need to be improved or even introduced.

"Preferable we would like to change towards RRU's based on care-pathways . . . , That works fine for mother-child and for an oncology center, but you also want to take the perspective of the older patient, so organize this for geriatrics and maybe for trauma. But we notice that this is really complicated".

DISCUSSION

Our inventory of all the Dutch general hospitals shows that their structure can be categorized based on three types of basic building blocks: units, clusters, and centers. This categorization shows some similarities but also important differences with the existing categorizations.[64] It seems that Dutch general hospitals do not use a traditional professional design (anymore) as there is no organizational division between medical and nursing staff (ibid). In each design, in all types of medical departments, both nurses and doctors are housed. Hospitals primarily based on units clearly resemble a clinical divisional design, as these units are mostly built around single medical specialties such as neurology.[64] They basically group services around 'the way medicine is organised'.[28,64] Hospitals that use clusters as an important building block cannot be easily related to existing categorizations, and this is the most prevalent design in the Netherlands. In this design, different specialisms are 'clustered' that have similar work processes and patient trajectories and therefore require similar facilities and support structures. This design allows them to better deal with sequential interdependencies. However, within these clusters traditional units often still play a dominant part and the coordination

between them is not guaranteed; therefore, sequential interdependencies between specialties are less dealt with. Hospitals built around centers mainly resemble clinical institute designs as services and are often organized around patient conditions, such services for oncology and obesity.[64] However, a center can also be organized around care types such as acute care, chronic care, and elective care. Typical for all centers is their multi-specialties approach, in which traditional units are no longer relevant. Different hospitals use a combination of design logics to organize their centers. This seems to be related to scale because organizing all care around patient conditions would result in 'too many' (small) centers. The research suggests that such centers better allow for a process-oriented approach, dealing with both sequential and reciprocal interdependencies and leading to better outcomes.[25] However, in these hospitals the underlying forms of coordination often still need to be implemented to be able to reap these potential benefits.

It is important to notice that most Dutch hospitals slowly develop towards hybrid designs by using combinations of building blocks and design logics. As already mentioned, in hospitals with clusters units are still relevant, but in both cluster and unit hospitals, we also increasingly see the introduction of centers, especially around medical conditions that require intensive multi-disciplinary cooperation, such as oncology. At the same time, most hospitals are now introducing coordination mechanisms between and within existing building blocks (based on lean or value-based health care principles) to better deal with both sequential and reciprocal interdependencies. Some unit hospitals claim that their small size already allows for easy coordination, without the need to redesign their basic structure. This seems in line with the findings from a review on process redesign methods in which forty-one percent of the studies found success in 'changing employee practices to improve care processes, without additional resources or structural change'.[76] Our findings show that most Dutch general hospitals opt for incremental change towards a more process-oriented design, instead of radical redesign.

We used the model of Paauwe to understand how these choices are shaped by institutional pressures, competitive drivers, and historically grown configurations and by the dominant coalition (of decision makers).[67–69] This model was very helpful in identifying and categorizing underlying mechanisms. Our study shows that within the Dutch health care system, competitive drivers are not important for redesigning Dutch hospitals towards a more process-oriented structure, while authors such as Porter strongly relate this development to the creation of competitive advantage.[77] The reason is that although there is market competition, the Dutch government has put a cap on the growth of the expenditure of hospital care, while demand is still growing. As a result, hospitals are increasingly cooperating instead of competing to deal with rising demands (see also [78]).

It seems that cost containment is more of a driver behind the restructuring of Dutch hospitals than competition. Insurers are stimulating hospitals to focus more on cost containment, but they still leave it to the hospitals to choose the structural changes they want to make, be they the introduction of coordination mechanisms, a structural redesign, or a combination of both. Normative pressures from within the health care sector and institutional 'mimicking',[79] are especially relevant for pushing the agenda. There seems to be a shared ideal in the Dutch care sector that hospitals should be organized in a more process-oriented manner and more around the patient's needs in order to deliver better quality. There is much consensus on where to go, but not on how to get there. Each hospital follows its own course, which is very much dependent on historically grown configurations of past decisions, existing structures, and power distribution (especially regarding the doctors). The first steps are therefore often taken in redesigning processes in which the doctors are already working intensively together, such as oncology. In other words, most hospital structures seem to be more the result of incremental, path-dependent choices than 'grand-designs'. Hospitals that do choose radical redesign seem to have a number of characteristics in common. They all have a stable, visionary board of directors and strong supportive medical representation on a strategic level (a strong dominant coalition). Only then are boards of directors able to go against the vested interests of (some) medical specialties, which will be affected by the redesign. These findings seem to be in line with different studies that show how important the support of doctors is for successful changes in hospitals.[76,80]

Other studies have also shown that efforts to stimulate multi-disciplinary cooperation are not always supported by doctors. Discussions about professional domains and autonomy are often found to be the cause.[80,81] In particular, when professional domains (partly) overlap, multi-disciplinary cooperation can result in turf wars.[80,81] For example, vascular surgeons and intervention radiologists provide alternative treatments for some of the same vascular problems. However, in one of the hospitals they told us that these specialists rarely cooperate and some even refuse to cooperate. Moreover, specialists can be hesitant to give up the large amount of autonomy they have in more traditional hospital structures. However, it also seems to depend on how much awareness there is of interdependency. For some patient conditions, the interdependency between different specialisms is more obvious and frequent than for others. An orthopedic surgeon can treat many of his patients without the aid of other medical specialists (except for support specialists, such as anesthesiologists). For these specialists, sequential (process) interdependencies are more important than reciprocal interdependencies. They will focus more on the development of care pathways within existing structures than on redesigning the organization towards multi-disciplinary centers. However, oncologists are for the treatment of most of their patients dependent on other specialists. Both

sequential and reciprocal interdependencies are important for them. They are therefore probably more likely to support the development of centers.

This study has a number of limitations. First of all, organizational diagrams can be an outdated or idealized representation of an organizational structure. They also do not show how coordination and steering actually take place. However, they do give a general idea of the structure and the choices that are made, and they help to identify the most important differences and communalities between hospitals, which was important for this study. Second, we only approached 12 hospitals of the 61 hospitals for phase 2; therefore, there may be a selection bias. We also expected a more or less even distribution between the three hospital types we identified based on our sample selection. However, in practice more hospitals were of the unit type, showing that it is difficult to correctly categorize hospital structures based on only organizational charts and annual reports. At the same time, the findings from our interviews seem to support our typology; they also confirmed that there are different hybrid approaches, and they confirmed importance of coordination mechanisms to develop more process-oriented structures. Third, we decided not to perform a member check because our conclusions and analyses were not related to specific hospitals but were based on a comparison between hospitals. Still, a member check could have given us additional information which may have been relevant for validating our findings. Fourth, we only interviewed two respondents for most of the hospitals that we sampled. This could have introduced a bias in the information that we obtained. However, we did try to speak to those representatives that could give us the best overview of the choices made and the steps taken in (re) structuring these hospitals. Finally, we only researched hospitals in the Dutch health care system, which has its specific characteristics, such as little competition between hospitals. This probably has an effect on the generalizability of our findings. In more competitive systems, market forces will probably play a stronger role. We do think that in most systems hospitals are complex organizations to change and are strongly dependent on the cooperation of the doctors. Therefore, we expect that restructuring will often be more the result of incremental, path-dependent changes than the product of 'radical redesigns'.

Conclusions

Hospitals increasingly have to take care of patients that suffer from multi-morbidity and often multiple chronic diseases. While these patients need help from different specialties, the research suggests that hospitals are still mostly organized in silos around specific medical specialties, which may inhibit multi-disciplinary cooperation. However, our study seems to show a more nuanced picture. Most Dutch hospitals are moving towards a more process-oriented design, not through radical redesign, but by introducing coordination mechanisms and the development of multi-specialty centers. Institutional pressures from within the health care sector and institutional 'mimicking' are the main drivers for these changes, but the specific path they take is dependent on their 'heritage'. Still, these changes especially concern specialisms in which the majority of the patients suffer from multimorbidities. Making sure other specialisms also start cooperating may require strong medical leadership at a strategic level.

3

COLLABORATION BETWEEN PHYSICIANS

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ABSTRACT

Health care today is characterized by an increasing number of patients with comorbidities for whom interphysician collaboration seems very important. We reviewed the literature to understand what factors affect interphysician collaboration, determine how interphysician collaboration is measured, and determine its effects. We systematically searched six major databases. Based on 63 articles, we identified five categories that influence interphysician collaboration: personal factors, professional factors, preconditions and tools, organizational elements, and contextual characteristics. We identified a diverse set of mostly unvalidated tools for measuring interphysician collaboration that focus on information being transferred and understood, frequency of interaction and tone of the relationship, and value judgements about quality or satisfaction. We found that interphysician collaboration increased clinical outcomes as well as patient and staff satisfaction, while error rates and length of stay were reduced. The results should, however, be interpreted with caution, as most of the studies provide a low level of evidence.

INTERPHYSICIAN COLLABORATION IN HOSPITALS: A SYSTEMATIC REVIEW OF THE LITERATURE

Health care today is characterized by an increasing number of patients with comorbidities, rapidly growing medical knowledge and technological innovations.[39,40] Where medical knowledge and technological innovations create a movement towards increased specialization in different fields of medicine, comorbidities require a more integrated approach.[23] The long history of hospital structures based on medical disciplines contributes to a highly specific view of patients' problems.[16,23,32] Therefore, to provide diagnoses and treatment for complex multimorbid patients, collaboration, communication, and coordination between doctors from different specialties is considered essential.[82–84] In short, to cope with the rising demands of today's health care, interphysician collaboration in hospitals is inevitable.

The present literature on collaboration in hospitals often focuses on interprofessional teams defined as the collaboration between disciplines such as doctors and nurses, pharmacologists, and/or allied health professionals.[23,85,86] This interest in interprofessional collaboration in the literature is also evident from the recently published reviews focusing on diverse aspects of interprofessional collaboration. For example, Pomare et al,[87] published a systematic review of key findings of interprofessional collaboration in hospitals demonstrating that interprofessional collaboration has a range of benefits for hospitals across the patient, staff, and organizational levels. These benefits include improved clinical outcomes, increased staff satisfaction, lower readmission rates, and reduced length of stay.[87] Additionally, Peltonen et al,[86] published a systematic review that demonstrated that a large number of instruments have been developed to measure interprofessional collaboration, aiming to measure similar but distinct topics, such as professionals, teamwork, communication, supportive factors, collaboration and conflicts. Schot et al,[43] showed with their systematic review that professionals actively contribute to interprofessional collaboration by bridging multiple types of gaps, negotiating overlaps in roles and tasks, and creating spaces to do so. An earlier published review already indicated that collaboration is essentially an interpersonal process that requires the presence of a series of elements in the relationships between professionals on a team together, which include the willingness to collaborate, trust in one another, mutual respect, and communication.[84] However, in literature on interprofessional collaboration physicians are either represented as a single unified group or a specific group of physicians is studied. Interphysician collaboration and communication are addressed much less frequently in the literature and are not addressed in existing reviews. We define interphysician collaboration as any form of interaction for the purpose of patient care between physicians from different medical specialties. In which we take

into consideration that collaboration may range from hand-off to formal consultation, to coprovision of care.[88]

Physicians all start out as medical students in the same program, but when they specialize, their professional identity is shaped by the behaviours of their peers and supervisors, the tasks and roles they are expected to fulfil and the specific context of their specialty.[89] The literature also shows that personality traits are related to choice of specialty.[90,91] As a result, different specialties exhibit different types of behaviour; for example, some are more likely to engage in nonconstructive behaviour or have different conflict styles for resolving issues.[92,93] The unique cultures of specialties and characteristics of medical specialists can cause miscommunication and tension that inhibits interphysician collaboration.[94] Physicians should therefore not be treated as a homogeneous group but as a diverse one that faces their own obstacles and challenges in collaboration. These challenges deserve attention, especially as interphysician collaboration becomes more important in the complex setting of hospital care.

New Contributions

Despite attention to interprofessional collaboration in health care, the literature on health care is often focused on collaboration between physicians and nurses or allied health professionals. With more multimorbid patients, collaboration between physicians is inevitable. To the authors' knowledge, no systematic evaluation of current evidence on interphysician collaboration has been conducted yet. We therefore conducted a systematic review of interphysician collaboration in hospitals. Our aim is to provide an overview of the literature on interphysician collaboration by answering the following three questions:

- What factors affect interphysician collaboration in hospitals?
- How is interphysician collaboration measured?
- What are the effects of interphysician collaboration on patient and hospital outcomes?

METHOD

We searched for and reviewed articles that examined interphysician collaboration in hospitals. Studies were identified by systematically searching six electronic databases (Embase, Medline, Web of Science, Cochrane, PscyhINFO, Google Scholar). The search strategy was designed in collaboration with a professional research librarian. The search combined terms from three categories: physicians AND collaboration OR communica-

tion (see Appendix for an example of the full electronic search strategy for all databases). The final search was performed on 12 June 2020.

Criteria

Studies were included if they met the following inclusion criteria:

- Focus of study: Studies that deal with interphysician collaboration, indicating what factors affect interphysician collaboration, measuring interphysician collaboration, introducing a form of collaboration, and articles pointing out the effect on health care of collaboration between physicians from different specialties. Studies in which "team" collaboration was researched and nurses or other health care personnel were included in the team were excluded when they did not specify the doctor–doctor collaboration.
- Field of study: Studies conducted within hospitals. We excluded studies that focused on interphysician collaboration between hospitals or between a hospital and another health care setting (eg, primary care).
- Study design: We included only empirical studies, with all empirical research designs. For example, theoretical papers or editorials were excluded.
- Publication status: To safeguard research quality, only studies published in peer-reviewed journals were included. Book chapters were excluded.
- Language: For transparency reasons, only studies written in English were included.
- Year of publication: We did not make any restrictions.

Record Selection

The search resulted in 9592 articles. After excluding the duplicate studies, 5074 articles remained for screening. Figure 3.1 summarizes the search and screening process according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.[95] The screening process consisted of two steps, for which we used Microsoft Excel. First, two researchers (AB and JW or MB) independently screened all records by scanning the titles and abstracts. Records were excluded if they did not meet the inclusion criteria. If the information provided in either the title and/or the abstract was not clear enough for a justified decision, the articles were included in the full-text screening phase. When the first and second readers disagreed, the third researcher also reviewed the article and decided whether to in- or exclude the article. This process resulted in 316 full-text articles being reviewed. Second, these 316 full-text articles were independently reviewed by two researchers (AB and JW or MB). Disagreements were discussed with all three researchers until consensus was reached. This process resulted in the inclusion of 63 full text articles.

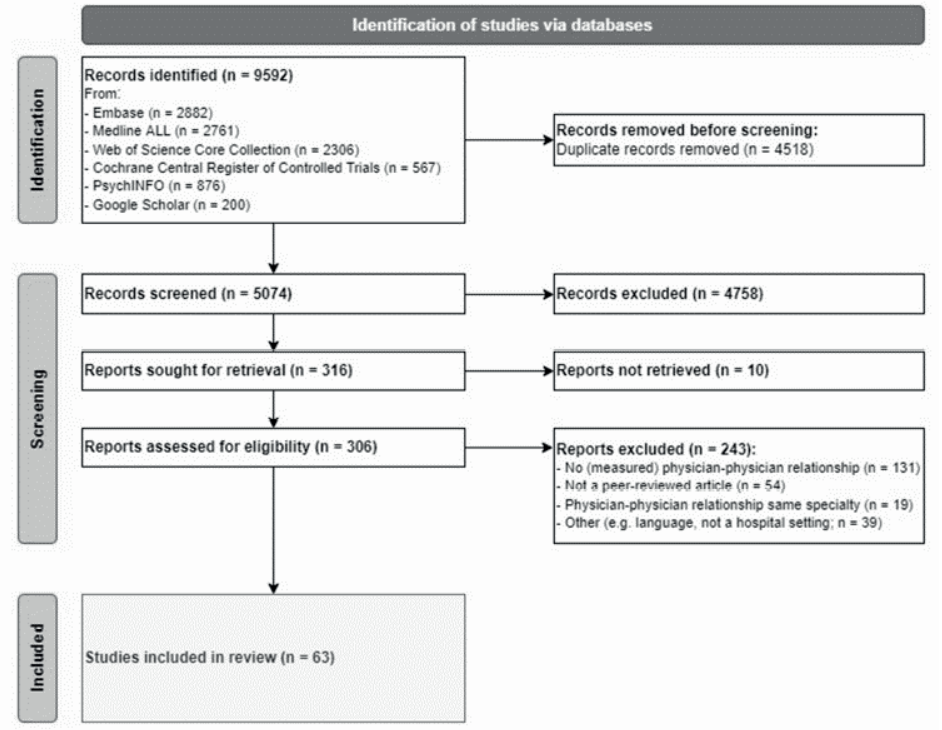

Figure 3.1. PRISMA 2020 Flow Diagram

Data Extraction Process

We developed a data extraction sheet using Microsoft Excel, pilot tested it on ten articles and refined it accordingly. The first author extracted the data from the included articles. Data extraction included information on the study aim, methods used, an indication of which research question was answered, information about the type of interphysician relationship (eg, with a supporting specialty, a consultation or handover), the results of the study, and discussion of the results.

In the next step, these data were converted into result tables that answer the three research questions. As a first step, the first author used an inductive coding strategy for each research question separately. Emerging categories were discussed among three authors (AB, MB, JW). For the effects of interphysician collaboration, the example from interprofessional literature in health care was followed using the categories of patient, staff, and hospital, which was immediately agreed upon. After a few discussions, a satisfactory categorization emerged for the factors that affected interphysician collaboration, although one of the categories changed names multiple times from procedures and guidelines in the beginning to preconditions and tools in the end. The category on

measurement was discussed on a number of occasions in which the first four categories, namely, climate and atmosphere, cooperative state of mind, connections, and cooperative behaviours, were developed. After testing this categorization, some extracted data did not seem to fit the descriptions given, and there was overlap between categories. An iterative process of modifying and rearranging categories was performed until a satisfactory categorization emerged that suited all extracted data.

For the effects of interphysician collaboration, we assessed the quality of evidence based on the Grading of Recommendations Assessment Development, and Evaluation (GRADE) scale. GRADE distinguishes four levels of quality of evidence (high, moderate, low, very low) based on study design. Studies can be upgraded or downgraded based on additional criteria, such as a high probability of reporting bias (downgrading) or strong evidence of association (upgrading).[96]

RESULTS

The search produced 9592 hits. After duplicates were removed, a total of 5074 hits were evaluated. First, the titles and abstracts were evaluated, resulting in the exclusion of 4758 articles. Second, the full texts (n = 316) were reviewed, of which 253 articles were excluded because the focus of the study was not physician–physician relationships (n = 131) or investigating relationships between physicians of the same specialty (n = 19); the publication status (n =54); and other reasons (eg, language, field of study). Finally, 63 articles were selected for the analysis.

Characteristics of the Included Studies

The included studies (n = 63) were published between 1980 and 2020, but the majority were published in the last decade (n = 49; 78). Almost all studies were conducted in Western countries (n = 58; 92%), and more than half of these were conducted in the United States (n = 37). Approximately half of the articles (n = 34; 53%) were published in a journal in the research domain of a specific specialty (eg, radiology, internal medicine, emergency medicine), highlighting the specificity of the conducted research. The other half included mostly journals within the field of health care services (n = 17). Different configurations of collaboration were investigated within the studies, namely, consultation (n = 26), handovers (n = 7), and approaching a patient together (n = 19). The remaining ten articles discussed collaboration in more general terms, not a specific configuration. Other distinctions found in the included articles are the specialties investigated, namely, generalists (n = 10; eg, emergency department physicians, geriatricians), supporting specialists (n=15; eg, radiology, pathology), specific specialists (n

= 17; eg, cardiology, urology) or physicians in more general terms (n = 21). Almost all studies made use of a quantitative research design (n = 58), and most of these used survey data or medical records. Only five studies used either qualitative methods (case study, focus groups) or a mixed method design.

At the start of our review, we aimed to answer three questions. Only six of the included studies (implicitly) gave answers to all three. Twenty-one of the 63 studies only (implicitly) answered one of the questions. Thirty-six of the 63 studies (implicitly) answered two of the questions; in most of these cases (n = 22), these studies indicated factors influencing interphysician collaboration and measured interphysician collaboration. The effect of interphysician collaboration for the patient or hospital was not addressed in these studies. Overall, the included studies not only showed a wide variety of focus but also discussed diverse topics. To better understand the differences and commonalities between these studies, we inductively coded their findings separately for each question. This resulted in a categorization of what factors affect interphysician collaboration based on 42 studies, of how interphysician collaboration is measured based on 47 studies, and of what the effects of interphysician collaboration are based on 22 studies (Figure 3.2; Table 3.1).

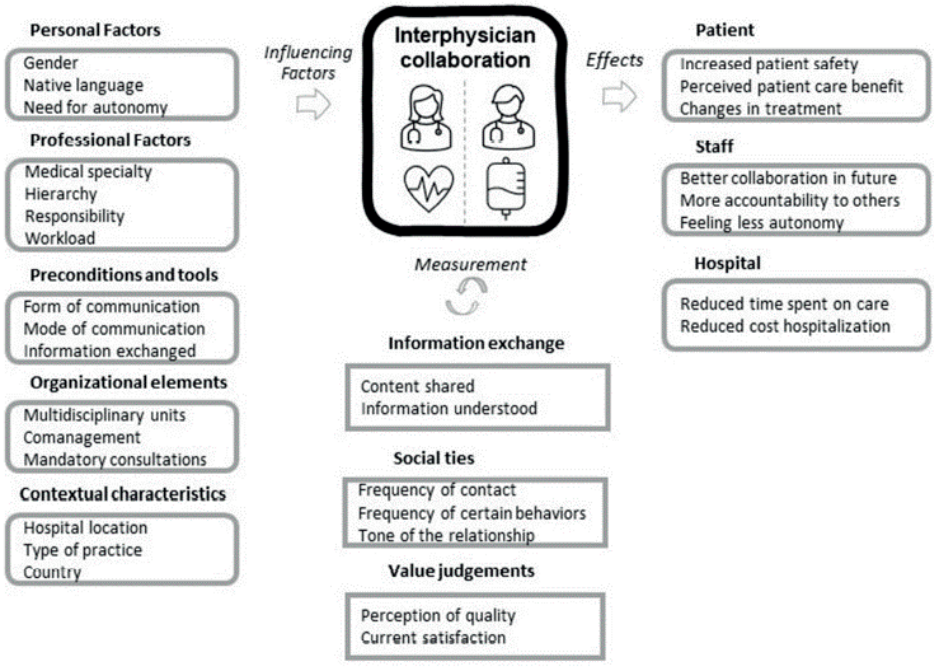

Figure 3.2. A visualization of influencing factors, measurement, and effects of interphysician collaboration

Table 3.1. General information on categorization for answering questions on inter-physician collaboration of the included studies (n = 63, in chronological order based on publication year).

	Study Characteristics					**What we learned about inter-physician collaboration**		
Reference	Country	Study Design	Terminology	Specialties	Study Purpose	**Influencing factors**	**Measurements**	**Outcomes**
Luke & Thomson (1980)[97]	USA	Chart Review (n = 183)	Consultation	Not specified	Exploratory examination of informal relationships among physicians	Groups having same reimbursement mechanisms are more likely to consult one another	Consultation frequency	-
Nakao & Axelrod (1983)[98]	USA	Survey (n = 100)	Communication	Not specified	Explore consensus as to meaning of adjectives and adverbs used to express frequency in the medical literature	Greater commonality of meaning among native (English) speakers	Communication interpretation	-
Ferguson & Rubinstien (1987)[99]	USA	Chart Review / Interviews (n = 85)	Consultation	Surgey/ Internal Medicine	Examine the practice of preoperative medical consultations in community hospital setting	-	Consultation quality	Changes in patient management (medication, laboratory test, procedure, anesthesia)
Leonard, Babbs, & Creed (1990)[100]	UK	Survey (n = 110)	Communication	Psychiatry	Examine written communication between psychiatrists and other hospital doctors	Preference for clear referral letters of about one page long with highlighted main points. Many physicians would like a personal discussion	-	-
Akre, Falkum, Hoftvedt, & Aasland (1997)[101]	Norwegia	Survey (n = 2628)	Communication	Not specified	Explore perceived communication atmosphere between physician colleagues in various arenas of Norwegian health care	Low degree of autonomy and high degree of stress are associated with interpersonal relationships not conducive to learning and coping	Communication atmoshpere	-

Reference	Country	Study Design	Terminology	Specialties	Study Purpose	Influencing factors	Measurements	Outcomes
Katz et al. (1998)[102]	USA	Survey (n = 396)	Consultation	Cardiology/ Surgery/ Anesthesiology	Ascertain what surgeons, anesthesiologists and cardiologists is important to obtain from a cardiology consultation and the effect of cardiologists' recommendations on perioperative management	-	Consultation quality	Changes based on recommendations in preoperative and postoperative management, not in intraoperative management
Madjar et al. (2001)[23]	USA	Survey (n = 229)	Collaboration	Urologists / Gynecologists	Examine differences among urologists and gynecologists' treatments and to characterize the collaboration between them	Statistically significant correlation between extent of collaboration and specialty and between degree of collaboration and country of practice	Collaboration (frequency, when, reasons not)	-
Dukerich, Golden, & Shortell (2002)[103]	USA	Focus Groups/ Survey (n = 1504)	Cooperation	Not specified	Examine relationships among physicians' organizational identification and cooperative behaviors	Organizational identification is positively related to engaging in cooperative behaviors.	Cooperative behaviors	-
Aminzadeh et al. (2003)[82]	Iran	Chart Review (n = 110)	Consultation	Infectious disease specialist	Analyze current referral letters which request infectious disease consultation to improve consultation based on medical records	-	Referral letter content	Reduction of unnecessary and inadequate antibiotic use

Reference	Country	Study Design	Terminology	Specialties	Study Purpose	Influencing factors	Measurements	Outcomes
Stoller & Striel (2003)[104]	USA	Survey (n = 181)	Consultation	Medicine / Surgery / Pediatrics	Assess clinicians' views on the determinants of effective inpatient consultation and the existing process of inpatient consultation	Direct physician-to-physician communication is valued when requesting and responding to an inpatient consult	Consultation value; Consultation satisfaction	-
Conley, Jordan, & Ghali, (2009)[105]	Canada	Chart Review (n = 188)	Consultation	Internal medicine	Determine percentage of consultation requests from general internal medicine that pose a clear clinical question to medical subspecialists, assess frequency of direct communication and describe differences in consultation process by subspecialty	Differences between subspecialties were seen (frequency consulted, urgency, direct contact) although not statistically significant	Consultation content	-
Hess, Lynn, Holmboe, & Lipner (2009)[106]	USA	Survey (n = 803)	Consultation Communication	Not specified	Evaluate a tool called the 'communication with referring physicians practice improvement module' which assesses and encourages improved communication among physician consultants and referring physicians	Consultants' communication were modestly associated with their gender and type of medicine subspecialty.	Communication quality	-

Reference	Country	Study Design	Terminology	Specialties	Study Purpose	Influencing factors	Measurements	Outcomes
Apker et al. (2010)[107]	USA	Tool development based on discourse analysis	Handoff Communication	Emergency / General Medicine	Develop and evaluate a handoff communication assessment tool.	-	Handoff content and language	-
Boulware, Dekarske, & Filice (2010)[108]	USA	Survey (n = 323)	Consultation	Not specified	Learn physicians' preferences for elements of an ideal inpatient medical consultation	Recommendations for effective consultation, first priority clearly state a question	-	-
Molleman et al. (2010)[85]	Netherlands	Survey (n = 1827)	Multidisciplinary Team Meeting	Not specified	Examine consequences for medical specialits of participating in multidisciplinary medical teem meetings in terms of perceived clinical autonomy, domain disctintiveness, and professional accountability	-	Involvement in multidisciplinary medical teams	Physicians more involved in multidisciplinary team meetings feel less clinical autonomy and more accountable to other specialties
Gasiorek & van de Poel (2012)[109]	Sweden, Denmark, Germany, Italy, Belgium	Survey (n = 188)	Communication	Not specified	Explore language-discordant mobile medical professionals' interactions with other doctors across contexts.	A mobile medical professional have issues with communication including difficulty with small talk, pronunciation, nonverbal communication and related cultural norms. They are less confident speaking to superiors than speaking to peers	-	-

Reference	Country	Study Design	Terminology	Specialties	Study Purpose	Influencing factors	Measurements	Outcomes
Kirschbaum (2012)[110]	USA	Survey (n = 58)	Communication	Surgery / Anesthesiology	Examine communication variables that are associated with face-negotation theory in a sample of operating-room physicians	Differences between the two groups of operating room-physicians which may result in different communication patterns. Both groups recognize the importance of collaboration as surgical team members	Factors underlying to communication (independence, interdependence, self-concern, awareness of others, conflict style)	-
Kirschbaum, Rask, Brennan, Phelan, & Fortner (2012)[111]	USA	Pre- and posttest survey (n = 44)	Communication	Obstetrics / Anesthesiology	Determine effectiveness of multidisciplinary team training on organizational culture and team communication	Nonsignificnat variance between obstetricians and anesthesiologists. Significant variance from pretest and posttest suggesting the training used in the study can improve communication for more effective collaboration	Factors underlying to communication (independence, interdependence, self-concern, awareness of others, conflict style)	-
Orchard, King, Khalili, & Bezzina (2012)[112]	Canada	Tool development based on literature review	Collaboration	Not specified	Develop, test, and refine the assessment of interprofessional team collaboration scale	-	Discrete elements of interprofessional care (partnership, shared decision making, cooperation, coordination)	-

Reference	Country	Study Design	Terminology	Specialties	Study Purpose	Influencing factors	Measurements	Outcomes
Carr et al. (2013)[83]	USA	Rotation evaluation / Program leadership meetings / Survey (n =26)	Co-management	Pediatrics / Surgery	Describe a 5-year experience with a co-managemnt model in a pediatric residency program	The dyadic model of transition led to positive changes in self-assessed preparedness to provide transition care and engage colleagues around the care of shared patients	-	Increased knowledge and trust between pediatric residents and surgeons
Pimmer, Mateescu, Zahn, & Genewein (2013)[113]	Switzerland	Experiment (n =42)	Communication	Medical students	Determine the effects of different synchronous smartphone-based modes of communication	Simple integration of images did not lead to improved knowledge gains, whereas images with guided noticing did. Integrating images was significantly more positive evaluated for support than only speech.	-	-
Uddin, Hamra, & Hossain (2012)[114]	Australia	Data analysis (n = 85)	Collaboration	Not specified	Determine the effect of collaboration networks among healthcare professionals on patients' medical condition	-	Social network analysis	In hospitals were physicians are on average less strong connected there are higher readmission rates and higher cotsts than in hospitals where physicians have a strong connection.

Reference	Country	Study Design	Terminology	Specialties	Study Purpose	Influencing factors	Measurements	Outcomes
Uddin, Hossain, Hamra, & Alam (2013)[115]	Australia	Data analysis (n = 85)	Collaboration	Not specified	Explore physician collaborations using measures of social network analysis and exponential random graph model	-	Social network analysis	Increased links among physicians, more relationships to maintain is positively correlated with hospitalisation cost and readmission rate. In network with small number of actors with a major collaboration and communication role is correlated with lower hospitalisation cost and readmission rate
Anthoine, Delmas, Coutherut, & Moret (2014)[116]	France	Tool development based on literature review / professional panel	Communication	Not specified	Develop and test psychometric properties of the communication and sharing information scale which assesses specifically interprofessional communication	-	Sharing of medical information, effectivness communication	-
Gupta (2014)[117]	UK	Pre- and posttest data analysis (n = 494)	Multidisciplinary Team Work	Geriatrics / Orthopedic Surgery	Assess impact of a geriatrician-led comprehensive and collaborative hip fracture care on hip fracture outcomes	Care model improves multidisciplinary teamwork between geriatrician and orthopaedic surgeon	-	Significant reduction in time to surgey and in hospital length of stay

Reference	Country	Study Design	Terminology	Specialties	Study Purpose	Influencing factors	Measurements	Outcomes
Kessler et al. (2014)[118]	USA	Survey (n = 760)	Handoff	Emergency / General Medicine	Desribe current status of inpatient handoff, desribe training of resident on inpatient handoff, assess opinion about best practices for inpatient handoff	Handoff factors identified as important include identifying high-risk patients, designating interrupted time to perform the handoff, and standardizing information provided during handoffs	-	-
Rosenkrantz, Kiritsy, & Kim (2014)[119]	USA	Survey (n = 49)	Communication	Several	Evaluate the degree of variability in clinicians' interpretation of expressions used by radiologists to communicate their level of diagnostic confidence within radiological reports	-	Communication interpretation	-
Hewett, Watson, & Gallois (2014)[120]	Australia	Survey (n = 147) / Interviews (n = 10)	Communication	Not specified	Explore medical records through the lens of communication accommodation theory	Specialists asked to contribute to the ccare of patients under the care of another specialty underaccomodate when communicating with treating specialists	Communication understanding	-

Reference	Country	Study Design	Terminology	Specialties	Study Purpose	Influencing factors	Measurements	Outcomes
Fatahi, Krupic, & Hellström (2015)[121]	Sweden	Focus groups	Consultation	Radiology	Study radiologists' experiences of written and oral communication with referring clinicians and its potential implications for decision making and patient care	Radiologists emphasize sufficient use of a communication tool. And a preference for oral instead of written communication	-	-
Kirschbaum et al. (2015)[91]	USA	Pre- and posttest survey (n = 85)	Communication	Anesthesiology / Surgery / Obstetrics / Gynecology	Measure the effect of multidisciplinary communication training on latent variables of communication	Significant increase and decrease in scores supporting more participatory communication and teamwork after training, especially among surgical physicians. Variance in pre training scores of conflict style for each physician group. After training all physicians integrating style approximately same and higher than pre-training	Factors underlying to communication (independence, interdependence, self-concern, awareness of others, conflict style)	-
Mazurenko & Hearld (2015)[122]	USA	Survey (n = 4720)	Communication	Not specified	Examine the relationship betweena medical practice's external environment and physician engagement in communication activities	Higher income levels and an urban location are associated with higher odds of communication with other physicians	Time spent on communication	-

Reference	Country	Study Design	Terminology	Specialties	Study Purpose	Influencing factors	Measurements	Outcomes
Smith et al. (2015)[123]	USA	Survey (n = 126)	Handoff	Emergency / General Medicine	Assess physicians' perceptions of the ED admission handoff process and identified potential barriers to safe patient care	-	Communication quality	Ineffective handoffs harm patients
Aripoli, Fishback, Morgan, Hill, & Robinson (2016)[124]	USA	Pre- and posttest survey (n = 115)	Collaboration	Radiology / Internal Medicine	Determine if incorporating radiology residents into clinical rounds would strengthen relationship between radiology residents and referring clinicians	Introduction of the "radiology rounds" increased face-to-face communication and clinical collaboration	Collaboration (relationship initiation, trustsworthiness)	Perceived patient care benefits. Increased trust of referring clinicians in radiologists and increased credibility of radiological interpretations
Dickerson et al. (2016)[125]	USA	Patient review (n = 100)	Communication	Radiology / Surgery	Determine if direct in-person communication between actue care surgical tam and radiologists alters surgical decision making	-	-	After multidisciplinary meeting discussing patients substantial changes in patient management, not due to different interpretation of imaging
Golab et al. (2016)[126]	Poland	Case study	Communication	Surgery	Determine whether a 3D model helps to plan and perform a complicated surgery	The 3D model helped draft a surgical plan that was accepted by all surgical teams involved with urology and cardiac surgery teams	-	Using the 3D model increased patient safety, facilitated communication between surgical teams and reduced surgery duration

Reference	Country	Study Design	Terminology	Specialties	Study Purpose	Influencing factors	Measurements	Outcomes
Gulacti, Lok, Hatipoglu, & Polat (2016)[127]	Turkey	Consultation observation (n = 519)	Consultation	Emergency medicine	Evaluate WhatsApp messenger usage for communication between consulting and emergency physicians	-	Consultation content	-
Junker et al. (2016)[128]	Germany	Experiment (n = 7)	Consultation	Radiology / Urology	Evaluate the accuracy of PIC-MABP for locating suspicious prostate lesions when applied to mpMRI datasets	The PIC-MABP is a reliable system to enhance interdisciplinary communication of mpMRI findings between radiologist and urologist	Communication understanding	-
Landgren, Alawadi, Douma, Thomas, & Etchegaray (2016)[129]	USA	Survey (n = 88)	Communication Speaking up	Pediatrics	Examine reasons reported by pediatric residents for not speaking up about safety events when they are observed in practice	Most common barrier to speaking up was a lack of interpersonal skills. Second most frequently reported reason for silence were related to safety of speaking up, including intimidation, fear of consequences and hierarchy concerns	Safety and team work culture	-

Reference	Country	Study Design	Terminology	Specialties	Study Purpose	Influencing factors	Measurements	Outcomes
Shetty, Vaghasiya, Boddy, Byth, & Unwin (2016)[130]	Australia	Survey (n = 40)	Consultation	Emergency medicine	Determine frequency and factors influencing perceived incivility during emergency department phone calls	Women were more likely to report perceived incivility. Consultation made to surgical specialties carried increased risk for incivility compared to medical specialties though not reaching statistical significance. Consultation with radiology for imaging requests were associated with the highest risk for incivility.	Grading consultation (positive, neutral, negative)	-
Chung, Jasien, & Maslow (2017)[131]	USA	Pre- and posttest survey (n = 71)	Collaboration	Pediatrics / Internal medicine	Educational innovation to improve pediatrics and adult medicine residents' interdisciplinary communication and collaboartion	Dyadic model with pediatrics and internal medicine for transition of patients with chronic medical illnessess, neurodevelopmental disorders and mental health conditions is well received	-	Dyadic model resulted in increased comfort in communicating with colleagues from other disciplines

Reference	Country	Study Design	Terminology	Specialties	Study Purpose	Influencing factors	Measurements	Outcomes
Kapoor et al. (2017)[132]	USA	Pre- and post data analysis (n = 363)	Collaboration	Intensivists	Report the impact of collaboration between cardiologists and noncardiac intensivists on CICU outcomes	The implementation of a collaborative cardiologist-intensivist management model increases communication betwee cardiologists and noncardiac intensivists	-	Implementation of a mandatory medical intensivist consultation resulted in decreased mortality, increased 28-day ventilator free days, significant reduced length of stay and reduction of hospitalization charge
Matta, Nunez-Atahualpa, & West (2017)[133]	USA	Call observation	Consultation	Radiology	Install a communication software that was customizable, to solve problems that radiologists encounter contacting other physicians	Implementing the software tool increased physicians satisfaction with radiologists; communication and availability	Satisfaction	-
Real, Fields-Elswick, & Bernard (2017)[134]	USA	Survey / Assessment (n = 51)	Communication	Several	Explore whether mindful residents perform better than their peers as members of the health care team	Communication had overall robust relationships with mindfulness	Communication (openess, voice, feedback)	-

Reference	Country	Study Design	Terminology	Specialties	Study Purpose	Influencing factors	Measurements	Outcomes
Gonzalez et al. (2018)[135]	USA	Chart review (n = 1234)	Communication Handoff	Emergency / General Medicine	Develop and test a handoff communication tool and a standardized process for transitioning patients from emergency department to hospital inpatient service	Implementation of the developed handoff tool improved communication between specialties	Satisfaction with communication tool	Nonsignificant decrease in transfers to intensive care unit and number of rapid response team calls. Signficant decrase in time to inpatient order. Satisfaction with the process improved confidence regarding accuracy and timeliness of information provided
Korbl, Wood, & Harvey (2018)[136]	Australia	Survey (n = 262)	Consultation	Pathology	Assess the attitudes of pathologists, dermatologists, surgeons and general practitioners as to what circumstances warrant telephone contact in addition to standard written report	-	Communication frequency Communication preferences	-
Macaluso et al. (2018)[137]	Italy	Survey (n = 79)	Consultation	Pathology	Explore the interplay between clinicians and pathologists for the diagnosis and management of iflammatory bowel diseases in clinical practice in Italy	The presence of a specified pathologists was higher in high-volume center s compared to low-volume centers. Clinical trials are also more frequent in high-volume centers.	General interplay	-

Reference	Country	Study Design	Terminology	Specialties	Study Purpose	Influencing factors	Measurements	Outcomes
Smith et al. (2018)[138]	USA	Pre- and post scoring (n = 110)	Handoff	Emergency / General Medicine	Evaluate impact of a structured communication strategy on the quality of admission handoffs	Introduction of standardized handoff process resulted in inmprovements in verbal handoff quality	Handoff content	Physicians perceive that higher quality handoffs will benefit patient care
Wetterauer et al. (2019)[139]	Switzerland	Experiment (n = 200)	Communication Consultation	Radiology	Investigate whether newly developed structured reports of prostate magnetic resonance imaging can improve interdisciplinary communication as comparted to non-structured reports	Potential of improved communication between radiologist and urologist by the use of structured reports	Communication understanding	Communication with structured reports leads to fewer mistakes and lower re-consultation rate
Bowen et al. (2020)[140]	USA	Interview (n = 94)	Communication Handoff	Not specified	Clarify in what situations and for what reasons current physicians do or do not communicate with transferring physicians about transitioned patients for whom transferring physicians are nog longer responsible	Barriers to communication were structures such as opposite work schedules and competing patient care priorities, relationship factors such as hierarchy and previous challenging experiences, lack of communication culture. Changing clinical decision or uncertainty are opportunities for learning, but only uncertainty was significantly associated with communication	Communication frequency	-

Reference	Country	Study Design	Terminology	Specialties	Study Purpose	Influencing factors	Measurements	Outcomes
Lama, Hogg, & Olson (2020)[141]	USA	Survey (n = 240)	Communication	Radiology	Compare and contrast the perceptions, experiences and other factors that influence communication behaviors about diagnostic errors between clinicans and radiologists	-	Communication frequency (diagnostic errors, feedback)	-
Noh et al. (2020)[142]	Korea	Chart review (n = 152)	Collaboration	Surgery	Compare postoperative sinonasal quality of life and olfactory function in patients who underwent endocsopic pituitary surgery by a neurosurgeon or by a collaborative team of surgeons	-	-	Postoperative subjective and objective olfactory function was better for patients where operation was performed by collaborative team of surgeons. Quality of life was not significantly different for both groups
Shaarani et al. (2020)[143]	Lebanon	Survey (n = 429)	Consultation	Not specified	Investigate the prevalence of WhatsApp use as an interprofessional communication tool among Lebanese physicians and explore the dimensions of its use	-	Frequency of using WhatsApp	-

Reference	Country	Study Design	Terminology	Specialties	Study Purpose	Influencing factors	Measurements	Outcomes
Sheikh et al. (2020)[144]	USA	Survey (n = 64)	Communication	Pathology	Survery dermatologists on how well pathologists communicate with them to assess which aspects of pathologists' communication skills are deemed most sgifnificant stratified by practice type	University affiliated dermatologists used electronic medical records more often to communicate with pathologists. Satisfaction with mode of communication was not different at a statistically significant level between different practice types	Satisfaction (communication, quality, completeness)	-
Mascia, Rinninella, Pennacchio, Cerrito, & Gasbarrini (2021)[145]	Italy	Survey (n = 20) / Clinical data (n = 222)	Multidisciplinary team	Not specified	Describe patterns of face-to-face versus electronic-based communication networks and performance, measured as promptness of treatment implementation	Electronic communication tools, which are generally viewed as an efficient way to support knowledge exchange, can instead be detrimental, especially when tacit knowledge must be transferred in multidisciplinary teams	Frequency clustering	-
Kessler et al (2012)[147]	USA	Prospective randomized study (n = 43)	Consultation	Emergency / General Medicine	Evaluate whether a standardized consultation model in the emergency department would improve physicians' ability to relay appropriate information and communicate successfully during consultation	Residents trained in using a standardized model for clinical consultation received higher ratings for their effectiveness. No natural progression in consulting skills with increased experience was shown	Consultation effectiveness rating	-

Reference	Country	Study Design	Terminology	Specialties	Study Purpose	**Influencing factors**	**Measurements**	**Outcomes**
Nayak, Beaulieu, Rubin, Jafi, & Lipson (2013)[148]	USA	Survey (n = 160)	Communication	Radiology	Identify referring physicians' preferences about radiology reports and quantify perceived value of multimedia reports compared with narrative text reports	Radiology reports with embedded images are viewed favorably with potential for beneficial outcomes	-	-
Bruckel et al (2014)[150]	USA	Survey (n = 43)	Collaboration	Cardiology / Cardiac Surgery	Assess the prevalence of Heart Teams and their association with collaboration in routine practice	Improved subjective collaboration between surgeons and cardiologists at institutions with case conferences and heart teams	Collaboration (existence, satisfaction)	-
Bradley et al (2015)[90]	UK	Survey (n = 606) / Focus group	Communication	Not specified	Explore experience with rude, dismissive and aggressive communication in hospitals	Seniority is relatively protective against rudeness. A subset of predictable specialties are more likely to be rude, dismissive, or aggressive in their communication. Happens because of workload, lack of support, culture	Frequency and effects of rude communication	When exposed to rude, dismissive, aggressive behavior mistakes are made endangering patient safety and making staff feel sad, angry, and demotivated
Sadigh et al (2015)[149]	USA	Survey (n = 200)	Consultation	Radiology	Evaluate referring physicians' perceptions of multimedia-enhanced radiology reporting as an alternative to traditional text-only radiology reporting	Favorable opinions of added value of multimedia-enhanced reporting	Satisfaction	-

Reference	Country	Study Design	Terminology	Specialties	Study Purpose	**Influencing factors**	**Measurements**	**Outcomes**
Heidemann et al (2016)[146]	USA	Pre- and posttest survey (n = 110)	Consultation	Not specified	Characterize the scope, identify root causes and implement a data-derived solution for the problems related to difficulty identifying correct consulting physicians	Introduction of a unified university hospital paging system	Satisfaction	Physicians concluded that the opportunity to contact the right physicians decreased adverse outcomes, increased satisfaction, improved the process, and decreased delays in patient care
Hollingsworth et al (2016)[152]	USA	Data analysis (n = 251630)	Teamwork	Not specified	Test whether teamwork among physicians is a determinant of surgical outcomes	-	Social network analysis	Higher levels of teamwork are associated with significantly improved clinical outcomes, lower readmission rates, less emergency department visits, and lower mortality
Afifi, Person, & Haddad (2018)[151]	Israel	Pre- and post data analysis (n = 212)	Communication	Pathology / Surgery	Evaluate the impact of dialogue between surgeons and pathologists in lymph node evaluation	Initiation of a structured oncology service enhanced dialogue between surgeons and pathologists	-	The dialogue resulted in significant improved examination of lymph nodes, significantly improving the percentage of patients receiving adequate staging of their cancer
Bhatti, Brown, Kazerooni, & Davenport (2018)[283]	USA	Survey (n = 188)	Communication	Radiology	Explore sentiments of radiology and referring provider residents with respect to the delivery and receipt of directly communicated radiology test results	Referring residents prefer direct communication of radiology results even for non-urgent unexpected findings, whereas radiology residents prefer less direct communication	-	-

Factors That Affect Interphysician Collaboration

The elements that influence collaboration can be categorized into five aspects: personal factors, professional factors, preconditions and tools, organizational elements, and contextual characteristics.

Personal Factors

The characteristics of an individual linked with interphysician collaboration are gender, age, native language, need for autonomy, and one's own conflict style. Regarding gender, a female physician is more likely to be rated more positively than a male physician in terms of collaboration.[106] Additionally, a female physician is more likely to perceive incivility during a medical consultation.[130] However, being female is not found to affect how the communication atmosphere is perceived.[101] Physicians with higher levels of autonomy are more likely to describe the communication atmosphere as open and supportive,[101] but at the same time, a lower preference for the autonomy of physicians seems to be beneficial for interphysician collaboration.[110] Overarching conclusions on gender and autonomy are not possible due to the different contexts in which these are measured. A clearer picture can be presented for language, age, and image, although that picture is largely based on one or two studies. Not having the same mother tongue, or in other words being language discordant, makes interaction harder.[98,109] Age is not a predictor for interphysician collaboration.[101,106] Being concerned about others' image in a conflict situation makes you more likely to be collaborative.[110] Feelings of incompetence hold people back from speaking up.[129]

Professional Factors

Factors associated with interphysician collaboration relating to the profession are the medical specialty, hierarchy, responsibility, and workload/stress. Hierarchy and a large workload seem to be inhibiting factors for collaboration between physicians. A high workload or perceived stress makes people more likely to exhibit rude behaviours,[90] creates time constraints for communication,[121] and makes the communication atmosphere more negative.[101]

Physicians with a higher position in the medical hierarchy are more likely to express negative behaviours, and for those lower in the hierarchy, it is harder to speak up to someone at a higher level.[90,109,129,130,140] For a physician to communicate with other physicians, he should feel responsible and see the added value of sharing information, for example, because it improves patient safety or it has a learning effect.[90,121,140] In eight studies, a difference between medical specialities was found, with some being more prone to collaborate or rated higher for collaboration and others more likely to express negative behaviours.[23,90,91,101,106,110,111,130] A clear overview of which medical speciality is

more likely to be collaborative cannot be provided, as most studies only focus on some specific specialties. Remarkably, specialties that are more likely to engage in negative behaviours (radiology, surgery, cardiology) are more often the targeted specialties in studies.

Preconditons and Tools

Research shows preconditions for successful interaction between physicians, mostly related to consultations or handoffs. The first step is often trying to find and reach the proper physicians.[104] The literature showed unified paging systems and software to be helpful.[104,133,146] In physician-to-physician communication, the form of communication, mode of communication, and information communicated are important. When consultation takes place, information that needs to be communicated is relevant clinical patient information,[100,121,135,138,144] a clear question to the consulting physician,[100,104,108,121,135] and the urgency of the request.[108,118,135] Different tools seem successful in supporting this, including the DE-PASS handoff tool,[135] the SBAR-DR strategy,[138] and a structured report with standardized content and understandable language.[100,104,118,121,128,139,144,147] It is also important that other professionals are informed when consultations or handovers are completed, so it is clear who is now primarily responsible for the patient.[108,135,138] The predominant mode of communication is written reports (integrated in the electronic medical record), embedding available imaging in these reports seems of added value.[113,148,149] However, physicians agree that additional oral communication is of added value,[100,108,121,144] as well as direct physician-to-physician communication.[104] A case study on complex surgery indicated that working together on a personalized 3D model that provides a realistic picture of the condition and anatomy helps physicians to mutually draft a surgical plan.[126]

Organizational Elements

The included studies showed positive effects of several organizational structures and procedures that stimulate physicians (sometimes mandatorily) to work together,[83,117,124,131,132,150,151] such as multispecialty units/teams, comanagement, and mandatory consultations. In addition to these more structured changes, a study also indicated that more face-to-face communication occurs when people work in the same team or building, indicating that physical proximity plays a role in collaboration.[145]

Contextual Characteristics

Another group of studies focused on more general characteristics of the hospital and its environment. The environment of the hospital has been mapped based on, for instance, levels of income per capita, population rates, poverty rates, and states dealing with malpractice crises. Physicians are less likely to refer patients to physicians who

deliver care based on a reimbursement method differing from their own reimbursement method.[97] A strong identification with the organization likely results in more collaborative behaviours.[16,103] Type of practice (eg, university affiliated) and practice size seem to have no influence on collaboration,[16,106] but only in higher volume hospitals does collaboration in research trials and other multispecialty activities exist.[137] Practicing in urban locations is related to higher odds of spending time on emailing and calling other physicians, and for the treatment of urinary incontinence and pelvic floor prolapse,[122] American urologists and gynecologists are more likely to collaborate than European urologists and gynaecologists.[16]

Measurement of Interphysician Collaboration

We categorized the included studies into three different groups of how interphysician collaboration is measured: information exchange, social ties, and quality/satisfaction. It is remarkable that each author uses his or her own unique measure for interphysician collaboration.

Within the category of information exchange, we distinguish between studies that measure the content shared between physicians and studies that measure whether shared information is understood. Measuring shared information gives insight into whether information that is deemed necessary for collaboration is shared during conversations and in reports (eg, charts, electronic medical records). This is mostly measured by reviewing charts. The information that should always be included according to these measures is the patient presentation, including patient history and current assessment of the patient's illness.[82,99,102,105,107,127,138,147] Additionally, a clearly stated consultation question and detailed recommendations on patient care are required.[82,99,102,105,138,147] In two studies, these requirements are captured through a global rating scale.[138,147] Studies using these measurement scales also show that information is often incomplete or unclear; for example, one of the studies shows that in a quarter of the cases, no clear clinical question was presented.[82,99,102,105] Although in many cases information is given, it is often not verified.[107]

Multiple studies check whether information shared (eg, vocabulary, reporting schemes) is understood by other physicians, also mostly by using chart reviews. Two studies checked whether expressions conveying likelihood (rare, atypical, occasionally, etc.) are interpreted by physicians in the same way; these show inconsistencies in the use of these expressions and differences in understanding.[98,119] Three other studies checked the level of agreement about a patient's medical condition, of which two were specific about the location of lesions.[120,128,139] For the locations of lesions, a reporting scheme (Prostate Interdisciplinary Communication and Mapping Algorithm for Biopsy and

Pathology [PIC- MABP]) and structured versus nonstructured reports are compared. It seems that a more structured report results in better understanding between physicians.[128,139] Another study shows that physician groups use specialty-specific language and do not accommodate enough for others to understand them.[120]

Related to social ties are the studies that focus on the frequency of contact between physicians, the frequency of certain behaviours expressed (eg, rude, criticist) and more abstract measured concepts related to the tone of the relationships (eg, conflict style, trustworthiness, organizational commitment, openness). Frequency of contact between physicians is measured by how often an interaction between physicians takes place or the time spent on interacting. Most of these data are based on surveys; others use claim data. Different studies use social network analysis to map and model physician care networks. From these frequency measures, we learn that engagement in interaction is diverse. As an example, one study shows that the majority of specialists are not yet involved in an integrated collaboration on complex coronary diseases,[150] while another study shows that specialists spend approximately five-and-A-half hours per month on multidisciplinary team meetings.[85] Other studies measure the frequency of behaviours perceived as negative and the frequency of communication about diagnostic errors, outing criticism.[90,130,141] From these studies, we learn that incivility occurs in approximately 10% of consultations and that rude behaviours are experienced by more than half of the physicians (59%) at least a few times per month. The relational part of these social ties is often measured by the concept of culture/atmosphere and/or teamwork/collaboration. We distinguish six features in the conceptualization of culture/atmosphere: openness, dialogue, generosity, competition, voice, and organizational commitment.[91,101,103,110,111,129,134] In the conceptualization of teamwork/collaboration, the strength of the relationship seems to be important, based on partnership, coordination, and trustworthiness.[112,116,124,129] A wide variety of scales are used to address the relational concepts of social ties. The scales vary, but the outcomes show that approximately 85% of the specialists participating in these studies agree that there is a supportive atmosphere,[101] over 50% are positive about the effectiveness of communication,[116] and 72% experience a positive safety culture.[129] Despite these more positive insights, studies also indicate that interventions help improve the teamwork climate.[91,111,124] Despite the diversity, the studies in general seem to capture how comfortable physicians feel about sharing their professional position with others.

Value judgements of quality and satisfaction focus on the perception of medical specialists about the quality of or satisfaction with current practice, such as the consultation process, received reports, and paging system.[104,106,116,118,123,129,146,149] Satisfaction with interphysician collaboration is also measured before and after implementing new com-

munication tools.[133,135] These value judgements of quality and satisfaction are all based on survey data. Multiple studies generally show high satisfaction rates with collaboration, communication, and written reports.[106,123,129,133,144,149] As an example, in one of the studies, 88% of physicians rated the perceived quality of collaboration as positive.[129] A few other studies show only moderate satisfaction levels with the consultation process, even after an intervention to improve these satisfaction levels.[104,135]

Effects of Interphysician Collaboration

From the included studies, we learned that the effects of interphysician collaboration are measured on three different levels, namely, the patient, staff, and hospital level. On the patient level, changes in the medical care or treatment plan for the individual awaiting or under medical care are measured. At the staff level, measurements focus on how medical professionals are affected by working together. Hospital measurements relate to how interphysician collaboration impacts the processes or outputs of the hospital system.

We identified 15 studies that mentioned the effects of interphysician collaboration at the patient level. We distinguish four different factors that were studied as outcomes of interphysician collaboration: patient management (n= 6), patient safety (n= 7), mortality (n= 3), and clinical outcomes (n= 1). The changes in patient management were changes in the medical treatment plan,[82,99,102,125] e.g., changes in antibiotic use and changed preoperative management. Furthermore, changes in treatment decisions based on better insights into the condition of the patient resulted in a higher percentage of patients receiving adequate staging.[126,151] Interestingly, one study shows that interphysician counselling did not always result in different interpretations of diagnostics, even when changes in patient management followed.[125] Patient safety is especially influenced by negative experiences of physicians resulting in mistakes, which could harm patients.[90,123,139,146] On the other hand, physicians believe that interphysician collaboration will benefit patient care, improve safety and reduce adverse events.[124,135,138] In difficult situations, working with multiple specialties results in lower mortality rates, although not always significantly.[126,132,152] The studied clinical outcomes (sinonasal functioning) show improved subjective and objective results for patients treated by a group of multiple physicians compared to only one physician, but quality of life does not significantly differ between groups.[141] Most of the studies only provide low to very low levels of evidence according to the GRADE, as they use cross-sectional surveys or quasi-experimental designs. Studies that have a stronger research design using pre- and postsurveys and provide moderate quality of evidence show that physicians felt or perceived patient care benefits.

On the staff level, we identified five studies, four of which investigated positive experiences. In these studies, the respondents were asked after an intervention that made interphysician collaboration inevitable (eg, comanagement, multidisciplinary team meetings, integrating radiology service in rounds) about the effects. Three of these studies indicated that working together makes them better prepared for collaboration in the future. This is based on increased trust, increased comfort in working together and increased knowledge about each other's area of expertise.[83,124,131] Another study shows that interphysician collaboration makes physicians feel less clinical autonomy and more accountability to other specialties but does not change the extent to which physicians feel their specialty is different from other specialties.[85] One out of five studies investigated negative experiences, namely, the effect of rude, dismissive, and aggressive behaviour. This kind of interphysician behaviour results in feelings of sadness, anger, and decreased motivation.[90] Although there are limited studies on the effects for staff, the preparedness for future collaboration is based on at least two prepost survey studies with the number of participants reflective of the departments. GRADE provides moderate quality of evidence.

Effects that impact the process or outcomes of the hospital system are displayed in nine studies, related to either reduced time spent on treatment or reduced costs of hospitalization. Reduced time spent on the treatment of the patient within the hospital is expressed as a decrease in length of stay,[117,132,146] lower re-evaluation rates,[114,115,139,152] and reduced surgery duration.[126] The costs of hospitalization consequently decrease with interphysician collaboration.[114,115,132] These outcomes are based on quasi-experimental studies, such as observational studies with a retrospective control or a comparison between the highest- and lowest-scoring hospitals on, for example, readmission rate. According to the GRADE, these studies only provide a low level of evidence, which should be considered when interpreting the results.

DISCUSSION

In contrast with previous reviews on interprofessional collaboration in health care, we targeted our review on a group that is underrepresented in the literature, as they are mostly studied as one homogeneous group: medical specialists. Our review confirmed that there are important differences between medical specialties, for example, differences in using words to express diagnostic confidence. These and other specialty-bound characteristics, such as the use of specialty- specific language, can be causes of misunderstanding and difficulties in collaboration between medical specialties. The aim of this review was threefold: to identify factors influencing collaboration between medical

specialties, identify instruments used for measuring interphysician collaboration, and summarize and categorize the effects.

Our review shows that good interphysician collaboration mostly has positive outcomes. Clinical outcomes for patients as well as patients' satisfaction with care improve. Staff members are more satisfied and experience the positive outcomes of working together. Some studies present reduced error rates, reduced length of stay or reduced hospitalization costs. The strongest, namely, moderate, evidence shows that physicians believe good interphysician collaboration will improve patient care, patient safety, and efficiency. Hence, there seem to be good reasons to try to stimulate and improve interphysician cooperation. However, although most studies present positive results, they should be interpreted with some caution. First, in most studies, collaboration was measured with an unvalidated instrument. Second, most of the studies had a low level of evidence. Notwithstanding these imperfections, our findings seem to be in line with studies on interprofessional collaboration, which show similar positive outcomes.[87]

We identified a very diverse set of tools used to measure interphysician collaboration, each often newly developed for a specific study. As we focused on how interphysician collaboration is measured, we categorized the instruments based on what they attempted to measure. The three main focus points are the information transfer between physicians, the social ties between the physicians, and value judgements about quality and satisfaction. Tools related to information transfer focus on the type of information shared and/or if shared information is understood by physicians. Tools focused on social ties measure the frequency of contact between physicians, the frequency of certain behaviours expressed (eg, rude, criticist) or the tone of the relationships (eg, conflict style, trustworthiness, organizational commitment, openness). Remarkably, none of the studies refer to relational coordination theory or use the appurtenant measurement instrument that captures both frequency and relational dynamics, while this instrument is often used in studies on interprofessional relationships.[44,45,153] Finally, tools that use value judgements focus on the perception of medical specialists about the quality of or satisfaction with current collaboration. These tools are often used to evaluate newly implemented communication guidelines. Collaboration is a comprehensive construct and, at the same time, is interchangeably used with coordination, cooperation, and communication.[154] This results in great diversity in operationalizations and the development and choice of measurement tools. Furthermore, only two of the included studies address the development and psychometric testing of a scale (Assessment of Interprofessional Team Collaboration Scale and Communication and Sharing Information- scale), and only in a few studies is an existing tool (eg, Inventory of Communication Atmosphere among Physicians [ICAP]) or a tool derived from an existing tool (eg, derived from the

Pharmacist- Physician Collaborative Index [PPCI]) used to measure interphysician collaboration. This also seems to be in line with a review of interprofessional literature, which showed that few tools have been validated for interphysician collaboration. However, they consider the CSI scale promising for assessing interprofessional collaboration in hospital settings.[86]

The review identified five categories of factors influencing collaboration between physicians: personal factors, professional factors, preconditions and tools, organizational elements, and contextual characteristics. The most researched personal factors were gender, age, and need for autonomy, but these factors appeared in different contexts, which makes generalization impossible. The professional factors showed that interactions are influenced by the specialty medical professionals belong to and their position on the hierarchical ladder. Certain specialists and physicians higher on that ladder are more likely to express behaviours that negatively influence collaboration. Other, more qualitative studies seem to suggest that certain types of specialties are more prone to cooperate and that cooperation between certain specialties is easier or more difficult as a consequence of either complementary or overlapping professional domains.[84] Such notions are lacking in quantitative studies, making it difficult to identify patterns and generalize findings, as studies often only focus on relationships between two specific types of specialties. Preconditions and tools are designed to support effective collaboration by demanding structured communication of relevant information. Examples are embedding available imaging in reports or using a 3D model of a tumour to discuss a surgical plan. Studies on organizational elements indicate that embedding structures that lead to collaboration and physical proximity can help medical specialists interact. Contextual characteristics seem, on the one hand, to create opportunities for interaction; for example, collaboration in research trials and multispecialty activities, which only exist in high-volume hospitals. On the other hand, contextual characteristics such as reimbursement methods can inhibit interaction, as they may influence specialists' income. Our review showed mostly similar determinants of interphysician collaboration as reported in research on collaboration between different health professionals.[84] The review on interprofessional collaboration, for example, distinguished organizational structures and coordination and communication mechanisms, such as standards and protocols, as determinants. Both support the overall impression that many determinants affect interprofessional collaboration.

One of the reasons to perform this review was the observation that the increasing number of complex multimorbid patients necessitates more collaboration, communication, and coordination between doctors from different specialties. However, most of the studies we found focus on collaboration between specialists with a supporting (radiologist,

anaesthesiologist) or referring (emergency physician) role. Research on collaboration between specialized care physicians in the treatment of patients with complex problems and comorbidities is lacking. In addition, it is striking that the studies we found hardly address Electronic Patient Records, nor online meetings or online patient encounters, which we consider providing great opportunities for bringing multiple specialties together. During the Covid crises the use of such tools has probably increased much, which might be addressed in future studies due to publication delay. Further, most of the studies we found focus on either consultation or coprovision of care. Especially coprovision of care seems to hold benefits for patients, but downsides of these types of interphysician collaboration that might be expected such as consequences for the medical profession (eg jurisdiction) and more practical barriers (eg insurance coverage) are not addressed.[88,155]

At the same time, different initiatives have been used to improve care for complex, multimorbid patients. For example, there is an introduction to the medical training of new types of hospital doctors with a more general focus.[156,157] However, some initiatives, such as those in the Netherlands, also assign a coordinating specialist for complex patients who is responsible for continuity and coherence in care.[158] Currently, we also see many hospitals in Western countries trying to reorganize their structures to stimulate interphysician and interprofessional cooperation. They are changing from traditionally structured hospitals mostly built around medical specialties to more process-based organizations structured around patient needs.[15] As our review found that physical proximity and multidisciplinary teams have positive effects on interphysician collaboration, it seems plausible that such a redesign of hospitals might stimulate interphysician collaboration. However, empirical evidence that reorganization effectively encourages the development of collaborative relationships between professionals is still lacking (see also Morley & Cashell, [159]).

Limitations

This review has some limitations. First, our initial interest and therefore our search terms were focused on the measurement of interphysician collaboration. Because of this focus, descriptive studies about interphysician collaboration did not meet our inclusion criteria. For example, we excluded multiple studies that did describe factors influencing interphysician collaboration but did not measure interphysician collaboration, for example, articles around themes such as boundary spanning. Based on that, we cannot guarantee that all possible factors affecting interphysician collaboration are represented within our review. Second, we included all terms that indicate an interaction, such as collaboration, coordination, communication, and cooperation. On the one hand, this made us include a broad spectrum of articles, but on the other hand, it also

made the review very diffuse. Nevertheless, even when we had chosen one of the terms beforehand, we still might have included a very broad spectrum of literature, as our review showed that all these concepts can be operationalized and measured in many ways. Third, we excluded grey literature by only focusing on articles published in peer-reviewed journals presenting empirical data and written in English. Thereby, we may have excluded relevant studies that present results that show no significant effects of (or on) interphysician collaboration. Because of publication bias, such studies are not always submitted or accepted for publication.

Implications for Research and Practice

Our findings suggest that quantitative research on interphysician collaboration is still in a developmental stage. There is a need for further development, validations and use of standardized measurement tools. Better use could be made of tools already developed to measure interprofessional collaboration, for example to measure relational coordination. There is a need for studies with stronger designs to produce higher level evidence. Studies should also focus more on current developments related to the need for more interphysician collaboration to deal with the increasing number of (complex) patients with comorbidities, the development of new hospital designs to promote such collaboration, and the effects of digitalization. Furthermore, attention should be paid to both positive and negative sides of different types of interphysician collaboration from the perspectives of multiple stakeholders (eg doctors, patients, managers, other care professionals).

Hospital management and policy makers can find some support in our findings for stimulating interphysician collaboration by introducing digital communication support tools, multispecialty units/teams, co-management, and mandatory consultations. Also, creating physical proximity can help medical specialties to interact more. These findings seem to support the relevance of hospital redesigns towards integrated practices.

The evidence suggests that medical specialists often recognize the importance of interphysician collaboration for quality and safety. However, they are not always aware of the existing barriers to do so. There seems to be a clear understanding that working together with other types of professional like nurses, although still remaining suboptimal (see for example Filizli & Önler, [160]) requires extra time an effort. Somehow interphysician collaboration is seen as less problematic. Studies show that next to practical barriers (time, proximity, availability), there are also barriers related to specialty language, specialist hierarchy, and autonomy. Medical specialists should be aware of these barriers and spent time and effort to break these down.

Conclusion

The number of studies on interphysician collaboration in hospitals has increased in the last decade, but the quality of the studies remains limited. Multiple tools have been developed to measure interphysician collaboration; however, most of these tools have not been validated in this setting and are only used for a single study. Despite limited evidence, our review showed promising results that collaborative practice between physicians increased the satisfaction of patients and staff while also reducing the length of stay, error rates, and hospitalization costs. The strongest evidence indicates that physicians believe that their collaboration will lead to better patient care. We noted that personal factors, professional factors, preconditions and tools, organizational elements and contextual characteristics can influence interphysician collaboration. Importantly, studies indicate that collaboration between physicians is influenced by the medical specialty they belong to. However, we still need to better understand the underlying patterns in collaboration between specialists and to what extent these patterns could be generalizable beyond the researched specialties, discuss the benefits and disadvantages of collaboration models in care, and address e-health possibilities for collaboration, to be able to deliver better care for the increasing number of patients with comorbidities.

4

CLINICAL LEADERSHIP: PHYSICIANS VS NURSES

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ABSTRACT

Background. Being a nurse or physician in today's complex healthcare practice involves more than just responsibility for one aspect of care during one episode in a patient's care trajectory. Both professionals are expected to take on a clinical leadership role and contribute positively to the reduction of care fragmentation and help in spanning professional boundaries. Although nurses may be well placed to identify the needs for integration, they may lack the position and status (compared to physicians) to address those needs as leaders. The aim of this study is to analyse similarities and differences between nurses and physicians in clinical leadership roles within a hospital context and explore how this relates to their interdisciplinary collaborative behaviours and perception on their job. *Method*. A cross-sectional survey among physicians and nurses was conducted to measure clinical leadership, job satisfaction, workload, and interdisciplinary collaborative behaviours. *Results*. Our results suggest that nurses (n = 329) and physicians (n = 100) show similar clinical leadership behaviours, based on equivalent scores on the clinical leadership scale. However, physicians score higher on the global leadership scale indicating they are more likely to perceive themselves as leaders than nurses. As clinical leaders, both nurses and physicians are more likely to express interdisciplinary collaborative behaviours. Furthermore, physicians who scored higher on the clinical leadership scale reported higher satisfaction with their job, whereas, for nurses, their score on the clinical leadership scale did not relate to their job satisfaction. *Conclusion*. As nurses in hospitals have the most frequent and direct involvement with patients, it seems inevitable for them to act as clinical leaders to promote patient-centred care. However, nurses less often perceived themselves as clinical leaders while showing suitable behaviours. Future studies should focus on the strategies nurses use to exert their clinical leadership, and for example, if nurses require the use of more dominant strategies to effect change.

INTRODUCTION

Being a healthcare professional in today's complex healthcare practice involves more than just being responsible for *one* aspect of care during *one* episode in a patient's care trajectory.[36,161] Professionals are expected to take a more holistic perspective and to be part of an integrated approach. Clinical leaders are seen as the "front-runners" in healthcare and regarded as being imperative to increase the integration of care.[37,38,46] Clinical leaders are expected to contribute positively by reducing care fragmentation and ensuring the spanning of professional boundaries.[37] According to Stanley and Stanley,[46] there is a consensus in the literature that the role of a clinical leader can be fulfilled by every healthcare professional involved in direct clinical care. Literature suggests that the fundamental attributes that identify a good clinical leader and role models are as follows: being a supportive, approachable, and effective communicator; being a motivator and mentor for others, while remaining visible in clinical practice and having values and beliefs on excellence and quality.[38,46]

Based on the reviews on clinical leadership[46] and medical leadership[162] and the literature-defined core attributes,[38,46–49] we argue that a clinical leader is a healthcare professional who is directly involved in clinical care and continuously puts effort in the improvement of care and inspires and motivates others to do the same. Clinical leadership is often regarded as an informal role that can be performed without this being delivered from a formal leadership position. Our definition uses the term healthcare professional purposely, as the clinical leadership role can and should be performed by physicians, as well as nurses. They are both expected to implement the changes necessary to meet current healthcare demands and to build bridges between domains.

Physicians and nurses in day-to-day healthcare practice clearly have different roles, reflecting their scope of practice and position towards patients.[163] The general public and many health professionals have for a long time perceived physicians as the leaders in patient care, while nurses were seen as playing a subordinate role.[164,165] Therefore, it is not surprising that leadership involving physicians and nurses form two distinct themes in the literature. Studies on the formal leadership of physicians often focus on balancing or bridging the gap between management and medicine, especially as there is an increasing drive to see physicians take on significant leadership roles within the healthcare system.[162,164,166] Some studies also discuss the informal leadership role that physicians play in patient care. This is often referred to as medical leadership or medical management.[48,164] Despite positive effects and growing attention in the literature to study nurse clinical leadership, informal nurse leaders are often seen as "rebels".[167] Also, within nursing, leadership is still equated with a formal leadership position,[165,167] while

research advocates clinical leadership by nurses as an essential element for innovation and change towards integrated healthcare.[168] In particular, the potential impact of nurses is great because of their ability to identify areas for improvement at patient and organizational levels.[49,169] Despite the differences of current leadership positions held by physicians and nurses, as clinical leaders, they are both expected to innovate healthcare, bridge domains to craft the practice of policy, play a role in implementing the changes necessary to meet current healthcare demands and, thus, fulfill a similar role.[165,170]

Although clinical leadership can be delivered by nurses and physicians and might even be a vital part of both of their day-to-day practice, there are di4erences that should be recognized. For example, physicians and nurses do not have the same leadership experience. They will have different educational backgrounds and different scopes of daily practice and hold different positions towards patients. So, understanding how both act as clinical leaders is central to understanding how clinical leaders can make changes to improve care.[46] However, to date, the authors are aware of only a few studies that address the similarities and differences between physicians' and nurses' clinical leadership and how their respective clinical leadership relates to patient, staff, and organizational outcomes.[166,171,172] Therefore, the aim of this study is to describe similarities and differences between clinical leadership behaviours of nurses and physicians within a hospital context and explore how clinical leadership behaviours relate to interdisciplinary collaborative behaviours, using a quantitative approach.

Background

Our first hypothesis relates to the notion that taking on the clinical leadership role may seem less natural for nurses. This is because physicians have more experience as informal leaders and are more likely to exert influence.[173,174] In the traditional hierarchy, nurses often have a more subordinate role that discourages them to question or deviate from rules and regulations or seek a leadership role, even if the purpose is to benefit the patient.[167,174,175] Furthermore, research shows that nurses believe they lack the necessary knowledge and skills to perform a clinical leadership role.[175]

Hypothesis I: nurses are less inclined to assume a clinical leadership role than physicians.

Clinical leaders are regarded as imperative for integration of care, but it is unclear whether taking up this role is facilitated and supported enough, especially when it relates to nurses.[176] Research seems to suggest that nurses are intrinsically motivated to take on a clinical leadership role,[177] which could also increase their job satisfaction. However, lack of time, lack of financial incentives, and lack of support from other health

professionals discourage nurses taking on a clinical leadership role.[178] Physicians may even resist nurses taking on this role if it questions their (traditional) leadership position or creates unclear role boundaries.[179–181] If nurses have to fight resistance to take on this new role and are not financially (or any other way) rewarded, it may increase their workload and reduce their work satisfaction. For physicians, this may be different, as acting as an informal leader is already part of their role (albeit in a different context) and is embedded in their identity.[48,182] We therefore expect physicians to be naturally inclined to take on a leadership role and not to perceive it as an increase in workload. As professional development is a strong predictor of physicians' job satisfaction,[183] we expect that physicians who engage in clinical leadership roles will be more satisfied with their jobs.

Hypothesis IIa: nurses' clinical leadership behaviours will lead to higher perceived workload but not necessarily higher job satisfaction.

Hypothesis IIb: physicians' clinical leadership behaviours will not necessarily lead to higher perceived workload but will lead to higher job satisfaction.

Hospitals with physicians in management positions have been shown to deliver better quality and, overall, more effective services than hospitals with those with less clinician involvement.[184] This has been related to the ability of these physicians to bridge the gap between management and physicians. Some authors have suggested that physicians also should take the lead in breaking down medical silos.[41,185] As clinical leaders who focus on balancing diverging perspectives and crossing specialist boundaries,[186,187] physicians should be able to improve relationships with physicians from other specialties.

Hypothesis III: physician clinical leaders will act as bridge builders (towards physicians from other specialties).

Their roles in improving care mean it is inevitable that physician and nurse clinical leaders will cross paths. Their unique characteristics and professional expertise can be, on the one hand, complementary and, on the other hand, challenging.[188] Complementary, as they both have their own scope of practice and values, and challenging as they differ in beliefs about possible solutions and perceived barriers.[188,189] Nurses perceive the hierarchy of professions as a barrier to their leadership development and their influence, if their voice is not recognized.[188,190] From research on formal leadership physician-nurse dyads and interprofessional collaboration, we learn that explicit goals, understanding of the other profession, and respect for one another are important for a complementary physician-nurse relationship to actually work well.[84,191] The literature shows that physi-

cians and nurses are both open to and value interprofessional collaboration.[188,192,193] However, as described by other researchers, those physicians with more power are less likely to desire a collaborative relationship.[193] As such, we argue that, for a collaborative relationship between nurse and physician clinical leaders to occur, nurses need to show how they add value. Nurse clinical leader need to make physicians aware that, together, they can achieve more as a result of the synergy. Nurses might encounter resistance from physicians by trying to be acknowledged in their leadership role as physicians might feel threatened in their leadership position. This might lead to tension between nurses and physicians.

Hypothesis IV: when nurses take on a clinical leadership role, this will negatively impact the relationship with physicians.

METHODS

From October to December 2020, we conducted a cross-sectional survey among physicians and nurses in a Dutch hospital. This 481-bed-counting hospital is in addition to providing good basic care focused on training, science, and innovation, which results in several domains in which this hospital delivers demonstrably distinctive care compared to care provided in other hospitals. Furthermore, according to the organizations information, the position of nurses is highly valued, witnessed by a Nursing Leadership program. Nurses and physicians participated in a survey with overlapping and profession-specific questions.

Sampling

Convenience sampling was used to recruit the study participants. All physicians (n = 392) and nurses (n = 850) working in the hospital were considered eligible for participation in the study and received a direct link to the survey via email. The minimum sample size needed was 89 (per group) to reach a sufficient power (95%), effect size (0.15), and alpha (0.05), based on G-power version 3.1.9.7. The survey was built in Castor EDC, a highly secured, cloud-based electronic data capture platform.[194] Beforehand, three physicians and two nurses assessed their respective surveys to identify ambiguities and provide feedback. After the first email invitation, in total, six reminders were sent, with an interval of between one and two-and-a-half week(s), to health professionals who had not completed the survey. Due to the low response rate after the third reminder, we decided to hand out paper copies of the surveys. The paper copies were distributed by wards' head nurses. To return the survey, a sealable envelope was attached and the sealed envelope could be returned in an anonymous box at the ward. A sixth reminder via email was sent

just before the Christmas holidays of 2020, where a raffle of 50 bottles of Champagne for everyone completing the survey before the start of 2021 was announced.

The questionnaire elicited respondents' background characteristics, such as gender, whether they held a formal leadership position, and tenure characteristics such as function and work experience (ranging from 1, <1 year, to 6, >21 years). As respondents might feel that responding to these questions reveals their identity, an opt out option was included to avoid dropouts. Respondents who did not answer all fifteen items of the instrument of main interest (clinical leadership) were excluded.

Measurements

Leadership

We assessed clinical leadership of physicians and nurses using a translated version (to Dutch) of the Clinical Leadership Survey (CLS).[195] We used the CLS for the following reasons: (i) the content of the questionnaire covered our definition of clinical leadership; (ii) it is a self-administered questionnaire measuring one's own leadership behaviour, which we considered suitable for use among health professionals that hold an informal leadership; (iii) the length of the questionnaire (15 items) is pragmatic for use among professionals with limited time; and (iv) although designed for nurses, it is still well-suited (with limited changes) to be administered with physicians.

The questionnaire is derived from Kouzes and Posner's model (1995) on transformational leadership and was adapted to reflect current clinical leadership practices. The text was back-translated (by a native English speaker) and then synthesised and reviewed by the target groups. The CLS assesses self-perceived transformational leadership behaviours based on 15 items. Participants are asked to assign the most appropriate rating on a five-point Likert scale (1 = almost never, 2 = occasionally, 3 = some of the time, 4 = most of the time, and 5 = almost always). The scale was reported to have Cronbach's alpha of 0.86.[195] Our translated Dutch version of the CLS provided an acceptable Cronbach's alpha of 0.79 (for the whole sample of physicians and nurses), with a negligible difference between Cronbach's alpha for physicians 0.80 and nurses 0.79. The total clinical leadership score was an average from the 15 items and ranged from 1 to 5, with higher scores indicating more self-reported leadership behaviour.

Next to the CLS reflecting transformational leadership behaviours, a two-item global leadership scale was used. This scale was added to check to what extent respondents perceived themselves as leaders in their clinical practice. The global leadership asks respondents to rate the following: (a) the extent to which they perceived themselves as leaders and (b) the extent to which they demonstrated leader behaviour in their clinical practice on a five-point Likert scale (1 = almost never, 2 = occasionally, 3 = some of the time, 4 = most of the time, and 5 = almost always).[195] The two-item global leadership scale was reported to have Cronbach's alpha of 0.78.[195] Our research found a good Cronbach's alpha of 0.85, with Cronbach's alpha of 0.83 for physicians and 0.86 for nurses. +e total global leadership score is a sum of the two items and ranged from 2 to 10, indicating the extent to which participants perceived themselves as leaders in their clinical practice.

Job-Related Measures

We used a single item to measure job satisfaction and a single item to measure workload. For job satisfaction, physicians and nurses were asked to rate how satisfied they were with their current job in the hospital on a scale from 0 (completely dissatisfied) to 100 (completely satisfied).[196] For workload, they were asked to rate how much workload they experienced on a scale from 0 (none) to 100 (a lot).[197] The use of single-item measures is justified under time constraints by research showing that it measures the same as, or is even more inclusive than a sum of items, when multiple items cannot grasp the range of variables that influence the measured construct.[196–199]

Physicians as Bridge-Builders

Our study used items to measure attitudes and behaviours that improve team cohesion, to indicate physicians' bridge-building behaviours towards other physicians. The four items are based on a subscale from a questionnaire measuring interprofessional collaborative competency — the Chiba Interprofessional Competency Scale (CICS29) — that evaluates competencies based on behaviour.[200] This subscale was reported to have a Cronbach's alpha of 0.83.[200] Our research adjusted the items by adding an explicit group towards whom the behaviours were expressed. For example, questioning "I consciously create opportunities for communication with physicians from another specialty," instead of "I consciously create opportunities for communication with other professionals." Respondents were asked to indicate to what extent they agreed or disagreed (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree) with a statement. We found an acceptable Cronbach's alpha of 0.75 for these items that were administered only to physicians. The total score was an average of the four items and ranged from 1 to 5. Higher scores represented more positive attitudes and behaviours for team cohesion.

Nurses as Bridge-Builders

The questionnaire on the International Organization of an Intensive Care unit is an instrument designed to assess the opinion of healthcare professionals on the organization for which they work.[201] The scale "multidisciplinary relations and communications" captures the relationships among physicians, as well as between physicians and nurses from a nurses' viewpoint. Respondents are asked to indicate to what extent they agreed or disagreed (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree) with a statement. Five statements explicitly captured the relationships between nurses and physicians, two statements the information processing by physicians, and two items the relationships between physicians (see Table 4.1).[201] To assess nurses' bridge-building capabilities, we decided to delete the two items that measured the relationships between physicians. The seven items together provided Cronbach's alpha of 0.71. The total score is an average of the seven items and ranged from 1 to 5; the higher scores reflect a more positive view on multidisciplinary relations and communication.

Table 4.1. Items measuring multidisciplinary relations and communications.

Statement	Reverse coded?	Relationship
I find it easy to discuss openly with the unit's physicians	No	Nurse-Physician
I have sometimes been poorly informed by the unit's physician	Yes	Nurse-Physician
Communication among the unit's physicians is very open	No	Among Physicians
I often have to check the accuracy of the information I receive from the unit's physicians	Yes	Nurse-Physician
I find it very enjoyable to talk with the unit's physicians	No	Nurse-Physician
When physicians talk with each other in this unit, they understand each other well	No	Among Physicians
The information exchanged by the unit's physicians is sometimes inaccurate	Yes	Information Processing
It's easy to ask for advice from the unit's physicians	No	Nurse-Physician
I feel that some of the unit's physicians don't fully understand the information they receive	Yes	Information Processing

Analysis

Statistical analyses were performed with IBM SPSS Statistics version 27. Descriptive statistics were used to analyse professionals' background characteristics (gender, profession, and tenure characteristics), clinical leadership, job satisfaction, workload, and bridge-building behaviours. Independent samples *t*-tests were run to compare physicians and nurses CLS total and factor scores. Cohen's *d* effect size was computed for the differences in total and factor scores. Pearson product-moment correlations were used

to describe coherence between variables. The other hypotheses were tested with simple regression analysis. Six simple regression analyses were run with clinical leadership as the independent variable and job satisfaction, workload, or the relationship with (other) physicians as the dependent variable.

Ethical Considerations.

The ethics review board decided that our study was outside the scope of the Netherlands' medical research involving human subjects act, especially because the study focused on professionals, instead of patients (METC-LDD-2019-Z19.019). Respondents were informed of the purpose of the research and participation in the survey was entirely voluntary. Participants agreed participating in the survey before answering the questions, and their identities are kept confidential.

RESULTS

The descriptive characteristics of the study sample are displayed in Table 4.2. In total, 139 physicians and 439 nurses responded to the survey, an average response rate of 46.5%. Unfortunately, 39 physicians and 110 nurses did not complete all fifteen items of the questionnaire of main interest and were excluded from analyses.

Table 4.2. Descriptive statistics of background characteristics, leadership, and outcomes.

			Physicians (n = 100)	Nurses (n = 329)
	Categories	Range of scale	Percent or mean (SD)	Percent or mean (SD)
Gender	Male		(45.0%)	(5.5%)
	Female		(39.0%)	(80.5%)
	Unknown		(16.0%)	(14.0%)
Formal Leadership Function	Yes		(24.0%)	(2.1%)
	No		(72.0%)	(97.0%)
	Unknown		(4.0%)	(0.9%)
Years working in profession	0 – 5		(23.0%)	(28.7%)
	5 – 15		(30.0%)	(27.8%)
	> 15		(32.0%)	(31.8%)
	Unknown		(15.0%)	(11.9%)

			Physicians (n = 100)	Nurses (n = 329)
	Categories	Range of scale	Percent or mean (SD)	Percent or mean (SD)
Years working in hospital	0 – 5		(29.5%)	(29.8%)
	5 – 15		(31.3%)	(27.1%)
	> 15		(2.0%)	(31.3%)
	Unknown		(14%)	(11.8%)
Clinical Leadership		1 – 5	4.00 (.41)	4.08 (.36)
Global Leadership		2 – 10	6.62 (1.63)	5.99 (1.87)
Job Satisfaction		1 – 100	80.69 (13.28)	79.95 (11.92)
Workload		1 – 100	67.83 (19.70)	68.42 (21.11)
Bridge-building		1 – 5	3.48 (.47)	3.61 (.61)

Independent sample *t*-tests were conducted to compare the clinical and global leadership scores between physicians and nurses (see Table 4.3). Nurses scored slightly higher on clinical leadership (M = 4.08, SD = 0.36) than physicians (M = 4.00, SD = 0.41), but this difference was not significant (t (427) = −1.77, p = 0.08, two-tailed). There was a significant difference in the global leadership scores for nurses M = 5.99, SD = 1.87) and physicians (M = 6.62, SD = 1.63; t (327) = 3.04, p = 0.003, two-tailed), in which physicians scored higher. The difference in the means (mean difference = 0.63, 95% CI [0.22, 1.04]) was small (eta squared = 0.03/Cohen's d = 0.35).

Table 4.3. Mean scores and differences between physicians' and nurses' clinical and global leadership.

Leadership score	**Profession***	**Mean**	**SD**	**SEM**	***T***	**df**	***p* value**	**Partial eta squared/ Cohen's d**
Clinical Leadership (1-5)	Physicians	4.00	.41	.04	-1.77	427	.078	.01/-.26
	Nurses	4.08	.36	.02				
Global Leadership (2-10)	Physicians	6.62	1.63	.16	3.04	427	.003	.03/.35
	Nurses	5.99	1.87	.10				

* Physicians n = 100; Nurses n = 329

Coherence between variables (clinical leadership, global leadership, job satisfaction, workload, and bridge building) was investigated using Pearson product-moment correlation coefficients (see Table 4.4). +ere was a statistically significant positive association between clinical leadership and global leadership for physicians (r = 0.49, n = 100, p < 0.001) and nurses (r = 0.37, n = 329, p < 0.001). For physicians, their leadership (clinical and global) was significantly associated with job satisfaction, whereas, for nurses, there was no significant association between their leadership and job satisfaction. Interestingly, for both physicians and nurses, their leadership was statistically significant and positively associated with bridge building. Although higher workload was associated with lower job satisfaction for nurses, this was not the case for physicians.

Table 4.4. Pearson correlation and significance between variables

	1.	2.	3.	4.	5.
Physicians					
1. Clinical Leadership	1				
2. Global Leadership	.49 ***	1			
3. Job Satisfaction	.35 ***	.31 **	1		
4. Workload	.11	.02	-.03	1	
5. Bridge-building[1]	.40 ***	.31 **	.14	.14	1
Nurses					
1. Clinical Leadership	1				
2. Global Leadership	.37 ***	1			
3. Job Satisfaction	.10	-.02	1		
4. Workload	.03	.03	-.20 ***	1	
5. Bridge-building[2]	.20 ***	.14 *	.28 ***	-.10	1

[1] Bridge-building measured as attitudes and behaviours that improve team cohesion between physicians
[2] Bridge-building measured as communication and relationships with physicians
p -value significant (two-tailed) at level: * <.05, ** <.01, *** <.001

A series of simple regression analyses were used to test if clinical leadership of both physicians and nurses predicted job satisfaction, workload, and bridge building (see Table 4.5). Clinical leadership did not significantly predict a nurses' job satisfaction (1 = 0.10, p = 0.082) nor workload (β = 0.03, p = 0.558). Clinical leadership did predict significantly a physicians' job satisfaction (β = 0.35, p < 0.001) but not their workload (β = 0.11, p = 0.283). Also, physicians' clinical leaders were more likely to express positive attitudes and behaviours towards physicians from other specialties (β = 0.40, p < 0.001), while nurse clinical leaders were more likely to rate positively their relation and communication with physicians (β = 0.20, p < 0.001).

DISCUSSION

Nurses and physicians are both seen as important driving forces behind initiatives to improve patient-centred care. They are expected to increase alignment and integration between healthcare professionals, especially by taking on informal roles as bridge-builders. This is part of their role as clinical leaders: "a clinical leader is a healthcare professional who is directly involved in clinical care and continuously puts effort in the improvement of care and inspires and motivates others to do the same." As physicians and nurses can both perform the clinical leadership role, but clearly have a different position in healthcare, we aimed to understand differences and similarities between physicians' and nurses' clinical leadership behaviours and explored how this relates to their interdisciplinary collaborative behaviours.

Table 4.5. Results of regression analyses. Clinical leadership predicting job satisfaction, workload, and relationships with (other) physicians.

	Job Satisfaction			
	Physicians		Nurses	
	β	*p*-value	β	*p*-value
Clinical Leadership	.35	<.001	.10	.082
R^2 (adjusted)	.11		.01	
F test	12.41**		3.05	
	Workload			
	Physicians		Nurses	
	β	*p* -value	β	*p* -value
Clinical Leadership	.11	.283	.03	.558
R^2 (adjusted)	.00		.00	
F test	1.17		.34	
	Bridge-building[1]			
	Physicians		Nurses	
	β	*p*-value	β	*p*-value
Clinical Leadership	.40	<.001	.20	<.001
R^2 (adjusted)	.15		.04	
F test	17.26**		11.92**	

* *F* test is significant at the .05 level (two-tailed)

** *F* test is significant at the .01 level (two-tailed)

[1] For physicians measured as attitudes and behaviours that improve team cohesion between physicians, for nurses measured as communication and relationships with physicians

In contradiction to our first hypothesis, our results suggest that physicians and nurses show similar clinical leadership behaviours. This is in contrast with literature suggesting that nurses have a more subordinate position that may discourage them to take on such a role[173,174] and that nurses believe they lack the necessary knowledge and skills to perform a clinical leadership role.[175] However, at the same time, our findings show that physicians are more likely to perceive themselves as leaders in clinical practice than nurses. It may therefore be that nurses are less likely to define the tasks related to clinical leaders, such as bridgebuilding and initiating change, as leadership. Clark argues that nurses equate leadership with authority and specific job titles rather than a way of thinking or behaving.[202] Another, but related explanation could be that nurses use less dominant strategies to fulfil these roles and therefore do not consider it to be leadership.[203,204] As to our knowledge, research comparing clinical leadership behaviour between nurses and physicians is lacking, we were not able to corroborate these possible explanations. It therefore should be part of future research.

In contrast to hypothesis IIa, nurses who showed clinical leadership behaviours did not perceive a higher workload. We expected nurses to not be facilitated and supported enough to take the informal leadership position[178] and that they would therefore perceive higher workload. However, maybe clinical leadership behaviours (e.g., bridge building and initiating change) are in fact not that remote from what nurses already do and nurses perceive it as part of their profession, not expecting extra compensation. Furthermore, our findings show that increased clinical leadership behaviour did not affect nurses' job satisfaction, while literature suggests that nurses who show clinical leadership and experience professional autonomy will be more satisfied with their jobs.[205,206] However, as discussed before, nurses are less likely to see themselves as "leaders" and are maybe also not perceived as leaders by others. They may therefore not receive the recognition and autonomy that they equate with formal leadership positions (as suggested by Clark[202]). It may also be that they do not "claim" autonomy and status, so they will not clash with other professionals (and lose their support) but instead use more nonconfrontational strategies to initiate change.[203,204]

In line with hypothesis IIb, our research showed that physicians who express more clinical leadership behaviours reported higher satisfaction with their job, while it had no impact on their perceived workload. We argued based on literature that for physicians, being an informal leader is embedded in their professional identity and so taking on a clinical leadership role does not lead to increased workload but provides an opportunity for professional development, leading to higher job satisfaction.[183] Although this seems a likely explanation for our findings, follow up studies may be relevant to better under-

stand the relationship between clinical leadership behaviour and job satisfaction both for nurses and physicians.

In line with hypothesis III, physician clinical leaders show more positive attitudes and behaviour towards physicians from other specialties. Other studies already suggest that clinical leaders can build bridges with other groups such as managers.[41,186,187] Our study adds that bridge building of these clinical leaders also relates to other medical specialties.

In contradiction to hypothesis IV, nurses showing more clinical leadership behaviours rated their communication and relationships with physicians better. Based on the literature, we expected that physicians might resist nurses taking on leadership roles as this affects their existing leadership position.[188,193] However, as suggested earlier, it might be that nurses use nonconfrontational strategies to perform their role as clinical leaders and are therefore not perceived as a threat to physicians. At the same time, some research studies suggest that complementary leadership between doctors and nurses is quite possible when they share clear goals.[191] The bridge-building capabilities of these clinical leaders might then improve the relationship between them. This could mean that clinical leadership of doctors and nurses can coexist and complement each other.

As healthcare is reforming to a patient-centred approach, modern healthcare leadership needs to align with quality improvements, such as innovation, clinical effectiveness, and patient experience.[207–209] Because nurses as a profession, at least in hospitals, have the most intensive and direct involvement with patients, it seems suitable for them to act as clinical leaders to promote patient-centred care.[163,210] Nurse clinical leaders are likely to position themselves as subordinate (followers) to physicians to influence how physicians lead, while not threatening their position and status.[203,204] Although this may be a successful strategy, for example, for building bridges, it may also reduce their impact in making other substantial changes in health care. Improving health care as a clinical leader may sometimes require more dominant strategies to convince and encourage healthcare professionals who are resistant to change.[207]

Unfortunately, our research does not provide a conclusive answer to this interesting discussion. We believe that this discussion is valuable as more dominant position of nurses may be required to take advantage of their ability to indicate problems in the patient safety domain and their appreciation of the significance of interprofessional collaboration, compared to physicians.[173,193]

Therefore, we suggest future research to investigate the clinical leadership role of nurses, the strategies they (can) use as a leader to make changes effectively towards more patient-centred care and strategies to deal with resistance. Two questions that based on literature should be addressed in more detail in future research are as follows: how to educate nurses to become clinical leaders[211] and how perceived and actual influence of nurses can be improved.[190] It would also be important to study strategies in which an organization contributes to more equality between physicians and nurses by, for example, formalizing the role of nurses in leadership positions. Another interesting direction for future research might be to investigate how possible conflicts between healthcare professionals can be managed better to gain benefits, instead of negative outcomes.

Limitations

As with other cross-sectional research, certain limitations applied to our study. First, although we believe our proposed causal relationships between the constructs are plausible, they cannot be determined on cross-sectional data only and require further investigation. Second, we used self-reported measures by the same group of respondents that can cause common method and common source bias. However, this risk was reduced by using di4erent scales for predictor and outcome variables. Third, we cannot convincingly say the view of our respondents necessarily represented the view of nonrespondents as we do not have insights in the features of the nonresponse. This is despite our sample representing the diversity in physician and nurse workforce for a hospital with a variety of represented medical specialties, units, experience on the job, and gender. Fourth, although we believe that the CLS fitted our research, based on multiple arguments and an acceptable Cronbach's alpha, it had not been designed for or tested with physicians before. Fifth, although the current study was not focused on impact of COVID, data were gathered during the COVID pandemic. This might have been a catalyst for building bridges as the pandemic showed closer interdisciplinary collaboration supported more efficient management of care capacities, brought a sense of cohesiveness, and increased recognition of various disciplines.[212,213] Sixth, we did not differentiate in nursing roles while this might have provided additional insight as literature shows that nurses in an organising role (e.g., arrange patient flow and start and steer quality improvement) can act as bridge builders between professionals and management.[214–216] Despite these limitations, we believe that our study provided relevant insight into the similarities and differences between nurses' and physicians' clinical leadership behaviour and contributes to current scientific and practical debates on the changing roles of healthcare professionals.

Conclusion

Based on their position in hospitals, nurses have the most frequent and direct contact with patients. Therefore, it seems inevitable for nurses to promote patients' perspectives and promote patient-centred care as part of their clinical leadership role. However, nurses less often perceived themselves as clinical leaders compared to physicians, despite showing similar suitable behaviours. The discussion following our results gives reason to presume that nurses from their nondominant position use more nonconfrontational strategies to exert leadership influence. Although this may be a successful strategy as it enables building bridges between nurses and physicians, it may sometimes require more dominant strategies to convince and encourage healthcare professionals to change.

5

CLINICAL LEADERS CROSSING BOUNDARIES

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ABSTRACT

Due to the growing number of complex (multimorbid) patients, integrating and coordinating care across medical specialties around patient needs is an urgent theme in current health care. Clinical leadership plays an important role in stimulating coordination both within and between specialty groups, which results in better outcomes in terms of job satisfaction and quality of care. In this light, this study aims to understand the relation between physicians' clinical leadership and outcomes, focusing on the sequential mediation of relationships and coordination with physicians within their own medical specialty group and from other specialties. A cross-sectional self-administered survey among physicians in a Dutch hospital (n = 107) was conducted to measure clinical leadership, relational coordination at two levels (medical specialty group and between different specialties), quality of care, and job satisfaction. Clinical leadership was related to better quality of care through more relational coordination within the medical specialty group. Clinical leadership was related to more job satisfaction through more relational coordination within the medical specialty group, through more relational coordination between specialties, and sequentially through both kinds of relational coordination. Physicians who act as clinical leaders are important for crossing specialist boundaries and increasing care outcomes. To improve multidisciplinary collaboration, managers should encourage clinical leadership and pay attention to the strong relationships between physicians from the same specialty.

BACKGROUND

The percentage of people with comorbidities has increased, not only among elderly individuals (above 70) but also in other age categories.[5,9,217] In the Netherlands, the proportion of adults over 55 who have multiple diseases rose from 22.7% in 2016 to 47% in 2020, 13.6% of adults below the age of 40 suffered from multimorbidity.[9] Complexity of care increased due to the high frequency of multimorbidity, which is often accompanied by problems related to polypharmacy, various treatments, and fragmented medical specialist visits.[5–8,11] These challenges strongly relate to the fact that the current health care system is still based on a single-disease paradigm that focuses on and subspecializes in single conditions, whereas complex patients have multiple conditions and require an integrated approach involving multiple specialties.[7,23,218] Earlier research stressed that for an integrated approach, structural reorganization is not sufficient.[219] Instead, research suggests that an integrated approach can be supported through relational coordination.[220] According to relational coordination theory, coordination that occurs through frequent, high-quality communication supported by relationships of shared goals, shared knowledge, and mutual respect enables an organization to better achieve desired outcomes.[220] In other words, the effectiveness of coordination is determined by the quality of communication among professionals in a work process, which depends on the quality of their relationships. The quality of their relationships, in turn, reinforces the quality of their communication.[220] However, as a base for the long-term success of integrated care, clinical leadership is also necessary.[221] Clinical leaders are physicians who from an informal position take initiative to, contribute to, and encourage others to improve care. Clinical leaders should serve as role models to demonstrate a clear vision about how to improve patient care and how integrated care can produce these needed improvements.[221] In this study, we aim to explore the associations between clinical leadership, relational coordination, and outcomes in terms of job satisfaction and physicians reported quality of care. Where we anticipate that relational coordination and clinical leadership will both positively influence outcomes, with relational coordination acting as a mediator between clinical leadership and outcomes.

In 2021, Bolton, Logan, and Gittell[44] published a comprehensive review on all studies published from 1991 to 2019 assessing the predictors and outcomes of relational coordination. Their review, based on 233 publications, provides increasing evidence that shared accountability and rewards, shared meetings and huddles, and opportunities to share information and ideas between interdependent physicians can foster teamwork and strengthen relational coordination.[44] A long history of research and guidelines focused on a single disease and hospital structures based on these naturally separated groups of medical specialties,[7,8,16,41] provides physicians within the same medical spe-

cialty group with the ability to meet the requirements to effectively coordinate care. In the past, accommodating these criteria for doctors with various medical specialties has received less focus. On the basis of this knowledge, we propose the following hypothesis regarding relational coordination among physicians:

Hypothesis 1: *Relational coordination among physicians within their own medical specialty group is stronger than between physicians from different specialties*.

The review by Bolton, Logan, and Gittell[44] also provides evidence that relational coordination among health care professionals is positively associated with quality outcomes (e.g., patient satisfaction, quality of life), efficiency outcomes (e.g., shorter length of stay, reduced costs), and staff outcomes (e.g., job satisfaction, lower burnout rates). Another review by House, Wilmoth, and Kitzmiller[222] showed that relational coordination is positively associated with staff outcomes among healthcare professionals, including higher job satisfaction, better work engagement, lower burnout, lower turnover, and reciprocal learning among health care professionals. Studies that were not covered in these reviews but that have been recently published confirm the positive relationship between relational coordination and employees' well-being (see, for example, Ahmad, Edwin & Bamber[223]; Olaleye[224]). Relational coordination should enable employees to coordinate their work more effectively, which should create the possibility of achieving higher quality of care while also reducing costs.[45] This is why relational coordination appears to be a promising mechanism for raising the standard of care while also addressing financial pressures. In addition, relational coordination can improve job satisfaction by providing professionals with the right resources to accomplish their work. Additionally, it represents high-quality connections, which are associated with job satisfaction.[225] Therefore, we propose the following regarding the relationship between relational coordination among physicians and physician reported quality of care and job satisfaction:

Hypothesis 2a: *Physicians reporting higher relational coordination among their own medical specialty group will report higher (a) quality of care and (b) job satisfaction*.

Hypothesis 2b: *Physicians reporting higher relational coordination with physicians from other specialties will report higher (a) quality of care and (b) job satisfaction*.

The pressure to integrate and coordinate care across specialties as a result of the rise in complex (multimorbid) patients raises the question of who should take the lead in integrated care in hospitals.[7,23] Some authors suggest that physicians should take the lead in breaking down medical silos.[41,185] Physicians should embrace roles as coordinators, collaborators, and leaders in daily clinical work. Although physicians are used to

play such roles within their specific specialist setting, they are now expected to assume responsibilities across disciplines, crossing medical specialist boundaries.[49,182,226] However, research seems to suggest there are considerable barriers for physicians to take on such roles such as poor interdisciplinary relationships, role conflict, and resistance to change.[49] Clinical leaders, according to Stanley and Stanley,[46] are clinicians who are actively involved in clinical care and hold and demonstrate beliefs and values about and passion for high-quality patient care. They are followed because of their visibility in practice and they use their values and beliefs as a driving force to engage in critical problems and face the challenges of clinical care.[46] These clinical leaders are expected to negotiate care plans, balance diverging perspectives in multispecialty teams, and thereby bridge specialist boundaries to provide continuity of care for patients with comorbidities.[186,187,227] We aim to test this expectation by studying the relationship between clinical leadership and relational coordination among different specialties. Additionally, we expect that these same clinical leadership behaviors will influence coordination and relationships within the medical specialty group. Therefore, the authors hypothesize the following:

Hypothesis 3: *Clinical leadership behaviors are positively related to (a) relational coordination among physicians within their medical specialty group and (b) relational coordination among physicians from different medical specialties*.

From the literature on job satisfaction among nurses and physicians, we learn that similar aspects are important for nurses and physicians to be satisfied with their job (salary, autonomy, and interactions with peers).[225,228] Previous research has shown that nurses who behave as clinical leaders provide higher quality care and are more satisfied with their job.[229] Therefore, it is likely that physicians who show clinical leadership behaviors will also experience these positive effects. Because leadership is deemed necessary to provide effective care coordination, integrate care, and bring about change,[187,230,231] we assume that the relationship between clinical leadership and job satisfaction is mediated through relational coordination. Furthermore, studies on how intragroup processes can facilitate more positive intergroup perceptions and experiences show that a strong group relationship and identifying with a group facilitates openness to contact and engagement with others.[232] Based on this knowledge, we propose that effective coordination within one's own medical specialty group is important for crossing boundaries and contributing to the possibility of effective coordination with physicians from different medical specialties. The authors thus hypothesize the following:

Hypothesis 4: Relational coordination within the medical specialty group and relational coordination among physicians from different specialties sequentially mediate the relationship between clinical leadership and (a) quality of care and (b) job satisfaction (Fig 5.1).

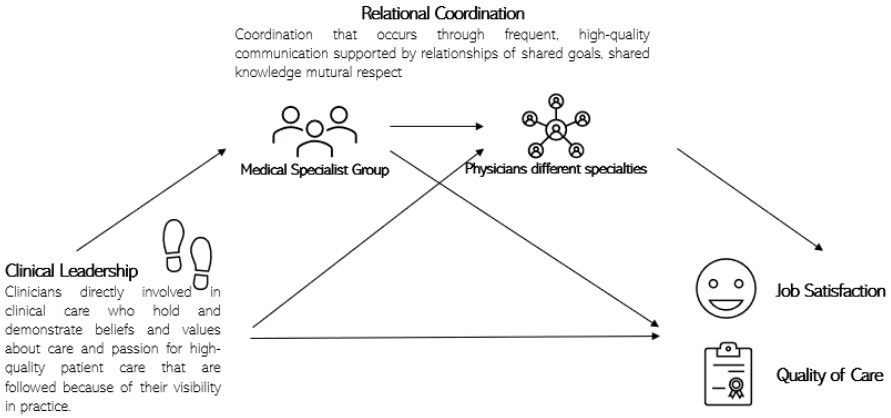

Figure 5.1. Representation of the mediation model

Setting

We conducted our research in a top-clinical hospital. In Dutch health care, there are different kinds of hospitals (general, top-clinical, university) that differ in the care they offer, their expertise, and whether they participate in academic research. A top-clinical hospital is not a university medical center but delivers more complex care and participates more in academic research than a general hospital. Furthermore, the Dutch context involves the existence of the medical specialist company. Many physicians in Dutch hospitals are not salaried workers; they are united with other physicians of the hospital in a medical specialist company. This company has a partnership with the hospital and, together with the board of directors, is responsible for the governance of the hospital, with which they try to reach proper agreements about policy and the care to be provided.

In May 2019, the studied hospital changed its organizational structure. It embedded five accountable multidisciplinary thematic units within its structure: mother and child; chronic care and frail elderly; oncology; acute care; and scheduled care. Within this structure, a single physician belongs to his or her own medical specialty group, belongs to a thematic unit, and is, in general, a physician working in this hospital (Fig 5.2). Whereas in the past the focus was on medical specialty group silos, emphasis is now placed on the thematic unit. This is reinforced by an organizational communication structure,

economic incentives, and dual leadership on the level of the thematic unit. Because of the new structure, physicians from the same medical specialty group may feel stronger connections to different thematic units. For example, some gastroenterologists focus on chronic bowel diseases (e.g., Crohn's disease) and are therefore part of the chronic care unit, while other gastroenterologists focus on gastrointestinal cancer and are part of the oncology unit. Overall, structural change forces and supports thinking in terms of care integration. With this intention, the organizational structure offers opportunities for the integration of care, making it possible in this study to focus on factors important for crossing specialist boundaries without the barrier of an unsupportive organization.

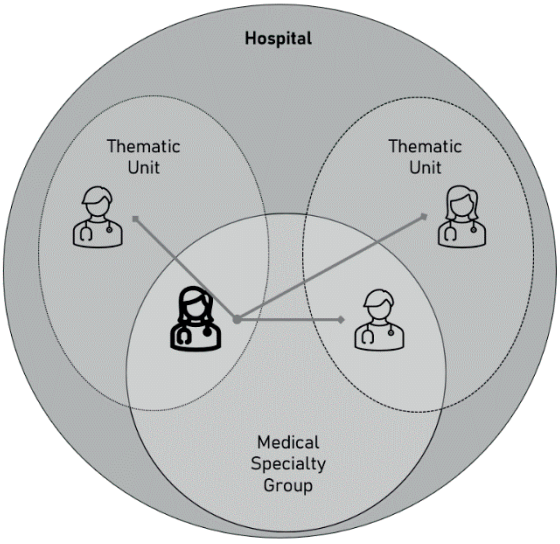

Figure 5.2. Representation of the hospital structure for a physician.

METHOD

From October to December 2020, we conducted a cross-sectional survey among physicians. We approached all physicians, from medical specialists to first-year residents (n = 392). An invitation was sent via email with a direct link to the survey, which was followed by six reminders. Due to a low response rate, we also handed out the survey on paper after the third reminder. In the sixth reminder email, we persuaded doctors (and nurses who received a survey at the same time) to complete the questionnaire with a raffle of 50 champagne bottles among respondents. In total, 139 physicians responded to the survey for a response rate of 35.5%, but 32 of the respondents quit the online survey before answering the first 60% of the questions. Of the 107 physicians (response rate 27.3%), 45.8% identified as female, 44.9% identified as male, 0% as nonbinary, and 9.4%

preferred to not reveal their gender or did not answer the question. The majority of the respondents were medical specialists (74.8%) from 27 different specialties (e.g., surgery, radiology, cardiology). The other respondents were junior doctors (4.7%), junior doctors in training (10.3%) or did not reveal their function or answer the question (10.2%). A formal leadership position as manager from an accountable multidisciplinary thematic unit or as coordinator of the medical specialty group in addition to their profession as a physician was held by 23 (21.5%) of the respondents. More than half of the respondents (62.6%) indicated that they had already worked in this hospital for more than six years. We included an opt-out option for the demographic questions to prevent physicians from quitting the survey due to questions about the anonymity of their responses.

Measurements

Clinical leadership. Physicians' clinical leadership was assessed using a translated version (Dutch) of the Clinical Leadership Survey (CLS).[195] Patrick and colleagues[195] derived their questionnaire from Kouzes and Posner's (1995) transformational leadership model and adapted the model to reflect general purpose clinical leadership practices and scenarios. The CLS assesses self-perceived transformational leadership behaviors based on 15 items divided into 5 subscales with 3 items each: challenging the process, inspiring a shared vision, modeling the way, enabling others to act, and encouraging the heart. Each item is scored from 1 to 5 (1 = hardly ever to 5 = always). A sample item is "I negotiate with and support members of the interprofessional health care team to help patients achieve their goals". The total clinical leadership score is an average of the 15 items and ranges from 1–5, with higher scores representing more self-reported leadership behavior. In previous research, the CLS has been shown to have a Cronbach's alpha of .86 with Cronbach's alphas for the subscales ranging from .64 to .78.[195] Our translated Dutch version of the CLS provided an acceptable Cronbach's alpha of .73 for the overall 15-item scale.

Relational coordination. Relational coordination was measured using seven survey questions on a five-point scale (1 = never, 2 = rarely, 3 = occasionally, 4 = mostly, 5 = all the time), including four questions about communication (i.e., frequency, timeliness, accuracy, problem solving) and three questions about relationships (i.e., shared goals, shared knowledge, mutual respect).[45] These seven questions were asked for two target groups, first for communication and relationships with physicians from the same medical specialty group (e.g., cardiology, surgery) and second for communication and relationships with physicians from different specialty groups (working in our study hospital in the same thematic unit, e.g., frail elderly, oncology). The relational coordination scores were derived by averaging the responses to the items, with higher scores indicating better or more desirable relational coordination.[225] In previous studies,

relational coordination has shown a Cronbach's alpha between .80 and .90.[225] Physicians were asked about communication and relationships with other physicians from their own medical specialty (α = .87) and physicians from other specialties in the hospital organized within their multidisciplinary thematic unit (α = .88).

Quality of care. To measure quality of care, we used one item that has proven validity from the International Hospital Outcomes Study.[233,234] Physicians were asked to "assess the quality of care from their medical specialty group" on a four-point scale ranging from poor to excellent (1 = poor, 2 = fair, 3 = good, 4 = excellent).

Job satisfaction. A single-item measure of job satisfaction was used. Physicians were asked to rate how satisfied they were with their current job in the hospital on a scale from 0 (completely dissatisfied) to 100 (completely satisfied). The use of this single-item measure is justified by research showing that it is preferred over a sum of items for job satisfaction because multiple items cannot grasp the range of variables that influence job satisfaction, and the single- item measure has shown good reliability and validity.[196]

Analysis

Based on our explanation of structures within the hospital, it could be argued that data were nested within the group structures; however, multilevel analyses were not suitable. A three-level multilevel analysis in which physicians were nested within medical specialty groups and medical specialty groups within thematic units was not suitable because physicians from the same medical specialty were not necessarily nested within the same thematic unit. For two-level multilevel analyses with clustering at the level of the medical specialty group, we conducted the first analysis, the random intercept model, which indicated that there was no clustering effect at the level of medical specialty groups in our data, and continuing multilevel analysis was not appropriate.[235] Furthermore, we had an insufficient number of groups for multilevel analysis; there were only 27 medical specialty groups within the hospital, whereas for multilevel analysis, having 50 or more groups is desirable.[236]

Statistical analyses were performed with IBM SPSS Statistics version 27 and PROCESS for SPSS v4.0.[237] To compare the participants' responses to the relational coordination questionnaire for different collaborations within the medical specialty and between medical specialties, a paired-samples t-test was performed. Correlational statistics were used to test the hypotheses on relationships between relational coordination and job satisfaction, relational coordination and quality of care, and clinical leadership and relational coordination. Hypotheses 4a and 4b were tested using Model 6 (sequential mediation model) in PROCESS v4.0.[237] Two sequential mediation analyses (one for each

outcome) were calculated with clinical leadership as the independent variable, relational coordination among physicians from the same medical specialty and relational coordination among physicians from different specialties as sequential mediators, and job satisfaction or quality of care as the dependent variable. The model and path coefficients were estimated using (multiple) regression analyses, while the indirect effects of the independent variable on the dependent variable via the mediator(s) were estimated using bootstrapping with 10,000 bootstrap samples.

RESULTS

Table 5.1. Correlations between study variables.

Scale	2	3	4	5
1. Clinical Leadership	.36***	.46***	.22*	.33***
2. Relational Coordination: Physicians from same specialty group		.38***	.45***	.56***
3. Relational Coordination: Physicians from different specialties			.22*	.38***
4. Quality of Care				.29***
5. Job Satisfaction				

Significance: * p <.05, ** p <.01, *** p <.001
Strength: .10 to .29 is weak; .30 to .49 is moderate, .50 to 1.00 is strong

Relational coordination at different organizational levels

A paired-samples t test was conducted to compare relational coordination scores between physicians from the same medical specialty group (M= 4.42; SD = .52) with relational coordination scores between physicians from different medical specialties (M= 3.87; SD = .53). There was a statistically significant difference between the two scores, $t(97) = 9.60$, $p < .001$ (twotailed), providing support for Hypothesis 1.

Correlations

The relationships between all five variables (clinical leadership, relational coordination medical specialty group level, relational coordination thematic unit level, job satisfaction, quality of care) were investigated using a Pearson product-moment correlation coefficient (see Table 5.1). All relationships were found to be positive, ranging from weak to strong associations ($0.22 \leq r \geq 0.56$, p values < .05). Compared to relational coordination between physicians from different specializations, there are greater correlations

between relational coordination between physicians from the same specialist group and job satisfaction and quality of care. However, relational coordination in all its forms shows positive correlations with job satisfaction and quality of care.

Sequential mediation

The sequential mediation analyses were based on n = 95 participants with no missing values on the relevant variables (Fig 5.3). A significant positive total effect of clinical leadership on quality of care was found, indicating that more clinical leadership is associated with a better quality of care when the mediators are not taken into account (ß = .317, t = 2.246, *p* = .027). This effect became nonsignificant when the mediators were included in the model, indicating that clinical leadership is not directly related to quality of care (ß = .098, t = .670, *p* = .505). Rather, a significant positive total indirect effect of clinical leadership on quality of care was found, ß = .16, BC 95% CI [.025,.308]. Further analyses revealed that only one of the three specific indirect effects of clinical leadership on quality of care was significant. A positive specific indirect effect was found for relational coordination among physicians from the same medical specialty, ß = .16, BC 95% CI [.042,.290], indicating that more clinical leadership is associated with more quality of care through more relational coordination among physicians from the same medical specialty. The specific indirect effects of clinical leadership on quality of care via relational coordination among physicians from different specialties, ß = –.00, BC 95% CI [–.080,.060], and consecutively via both mediators, ß = –.00, BC 95% CI [–.028,.023], were not significant.

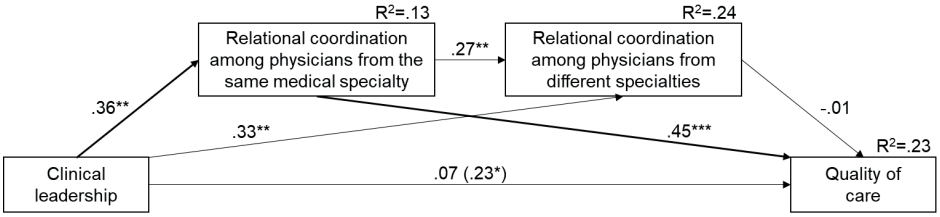

Figure 5.3. Results of the mediation model with quality of care as the outcome (H4b)

The results of the mediation model with job satisfaction as the outcome variable are displayed in Fig 5.4. A significant positive total effect of clinical leadership on job satisfaction was found (ß = 10.643, t = 3.188, *p* = .001), indicating that more clinical leadership was associated with greater job satisfaction when the mediators were not taken into account. This effect became nonsignificant when the mediators were included in the model (ß = 2.558, t = 3.078, *p* = .408), indicating that clinical leadership is not directly related to job satisfaction. Rather, a significant positive total indirect effect of clinical leadership on job satisfaction was found, ß = .25, BC 95% CI [.080, .398]. Further analyses

revealed that all three specific indirect effects of clinical leadership on job satisfaction were significantly positive: first, via relational coordination among physicians from the same medical specialty, ß = .16, BC 95% CI [.002, .284], second, via relational coordination among physicians from different specialties, ß = .07, BC 95% CI [.004, .162], and third, via relational coordination among physicians from the same medical specialty and subsequently relational coordination among physicians from different specialties, ß = .02; BC 95% CI [.001, .076]. These specific indirect effects indicate that more clinical leadership is related to greater job satisfaction through more relational coordination among physicians from the same medical specialty, more relational coordination among physicians from different medical specialties, and consecutively via both.
Most of our hypotheses are supported by the results of the study, except for Hypothesis 4b, which is only partly supported.

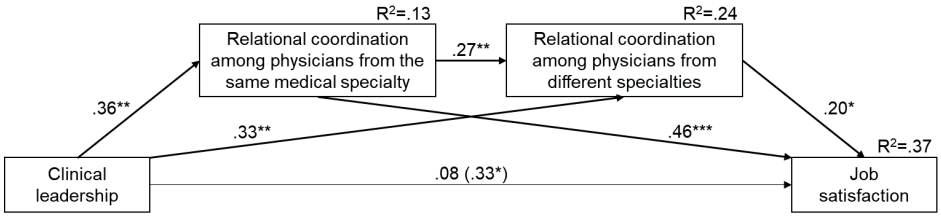

Figure 5.4. Results of the mediation model with quality job satisfaction as the outcome (H4a)

Additional analyses

Independent sample t-tests were performed to compare scores from physicians in a formal leadership position with those who are not, to assess the robustness of the study's findings. The independent t-tests showed no differences between physicians' clinical leadership scores (t (98) = 1.35, p = .18 two-tailed) for physicians in a formal leadership role (M = 4.05, SD = .38) compared to those not in a formal leadership role (M = 3.92, SD = .50), nor for the other variables used in the analyses.

To assess the robustness of the study's findings, we also conducted separate correlation analyses for the items of relational coordination (i.e., frequent, timely, accurate, problem- solving, shared goals, shared knowledge, mutual respect) with job satisfaction and quality of care. The results from these analyses were equivalent to those from the presented main analyses.

DISCUSSION

The aim of our study was to examine the relationship between physicians' clinical leadership and outcomes (i.e., job satisfaction and quality of care) by focusing on the sequential mediation effect of relational coordination between specialists on two levels: first, relational coordination between physicians from the same medical specialty group (e.g., cardiology, surgery); second, relational coordination between physicians from different specialty groups (working in our study hospital in the same thematic unit, e.g., frail elderly, oncology). Physicians who act as clinical leaders put effort into bridging boundaries by embracing roles as visionary coordinators and collaborators. We expected this to strengthen the relationships and coordination with other physicians, which has been linked in earlier research to improved job satisfaction and quality of care.[44] Our findings show that relational coordination at the group and thematic levels acts as a mediator in the relationship between clinical leadership and job satisfaction. In addition, our findings indicate sequential mediation, in which clinical leadership is first related to relational coordination at the specialty group level, which consecutively impacts relational coordination between different specialties (at the thematic level) and ultimately leads to job satisfaction. Other studies suggest that this sequence may be explained by the fact that more positive intergroup perceptions and experiences lead to more openness to contact with others.[232] This will subsequently be discussed in more detail. For quality of care, only relational coordination at the group level acted as a mediator in the relationship with clinical leadership. The quality measure used represents a physicians' rating of the *"quality of patient care within their own medical specialty group"*. Although multidisciplinary collaboration is deemed necessary for quality of care for a multimorbid patient, physicians might not have considered multidisciplinary care in their answers. Furthermore, our study shows higher levels of relational coordination between physicians within than outside the medical specialty group.

Although the need for collaboration across specialties to meet patients' needs is not being debated, how to achieve this integration in day-to-day practice is.[221,238,239] Earlier research has stressed that structural reorganization to redraw group boundaries is considered insufficient for improved collaboration.[219] Instead, a combination of numerous other strategies may help to improve intergroup relations, such as recognizing and facilitating proactivity, supporting professionals' autonomous motivation, providing formal opportunities for staff collaboration, sending persuasive messages stressing shared values and responsibilities, and differentiating roles.[219,240,241] Our research demonstrates that self-perceived clinical leaders who exhibit behaviors like having deep dialogues with peers are more inclined to collaborate with physicians from other specialties. Clinical leaders appear to help strengthen intergroup relationships.

In addition to the role of clinical leadership in stimulating interdisciplinary cooperation, our research shows the importance of good relations within medical specialty groups. The hospital in which we performed our study aimed to stimulate interdisciplinary cooperation by replacing the existing monodisciplinary units with multidisciplinary units. Initially, it was even suggested that the different specialty groups be dissolved because these groups may hinder a multidisciplinary focus.[33] Traditionally, medical specialty groups play an important role in developing professional identities, producing evidence-based practice, and providing quality control and education.[242,243] As long as specialists derive their identity and security from their medical specialty group, these groups will remain relevant, even in a multidisciplinary setting. Therefore, it seems that mono- and multidisciplinary physician groups need to coexist and form a network. In the literature, collaboration as networks of interdependent teams that coordinate to achieve shared goals was introduced by Mathieu and colleagues as a multiteam system perspective.[244,245] The work by Amy Edmondson on teaming provides an interesting alternative perspective stating that organizational culture and physicians' mindsets need to be *reframed;* creating awareness among physicians on how their own expertise interacts with other specialties.[246] With the goal of creating fluid, collaborative, interdependent multidisciplinary teams based on patients' needs with a shifting mix of partners across organizational boundaries.

Limitations

We acknowledge that our research should be interpreted with some caution. First, although the proposed relationships are plausible and theory driven and were consistent with findings from previous studies, the causal direction in the association between the constructs cannot be determined based on cross-sectional data only and requires further study. Second, there is a risk of voluntary response bias because of the low response rate; it is possible that only physicians who felt strongly about the topic decided to participate in our research. Nevertheless, our sample seems to represent the diversity in the physician workforce in a hospital considering the variety represented in medical specialties, physician functions, experience on the job, and experience within the hospital. Third, we used self-reported measures that, despite the guarantee of respondents' anonymity, are subject to various biases, such as social desirability and common method and source bias. However, the risk of common method bias was reduced by using different scales for predictors and outcome variables. Despite these limitations, we believe that our study provides relevant contributions to current scientific and practical debates on clinical leadership, interdisciplinary cooperation, and care coordination. To further understand the collaboration between physicians of various specialties and care coordination, it would be beneficial to conduct similar studies in other (types of) hospitals as the study was only conducted in one. In addition, other outcome metrics,

such as patient outcomes, may also contribute to a deeper comprehension. Finally, the current study only used relational coordination between relatively large groups, potentially important insights could be gained by looking at collaboration between physicians per specialty.

Practical implications

First, our findings suggest that physicians should strive to demonstrate clinical leadership behaviors, as these are associated with increased job satisfaction. In addition, managers should encourage clinical leadership by physicians because the behaviors they exhibit foster relationships among physicians and can strengthen interdisciplinary collaboration. Second, as seen in this study, there is still potential for a further increase in relational coordination between physicians from different specialties compared to those between physicians from the same specialty. Only the introduction of multidisciplinary structures (as implemented in the study hospital), may not (yet) offer sufficient support to fully commit to multidisciplinary care. As a first step towards future improvement of the quality of collaboration, managers could discuss levels of relational coordination amongst members of the multidisciplinary unit. In addition, focus on multidisciplinary care should be embedded in, amongst others, training and medical quality review, to encourage collaboration and reduce focus on specialist silos. Third, in contrast to earlier suggestions, our findings show that currently the medical specialty group is like a bird's nest. It provides physicians with a stable base which helps them to explore and form multidisciplinary collaborations. So, when encouraging multidisciplinary collaboration between physicians' focus should not only be on the multidisciplinary relations, but they should also continue to pay attention to strong connections between physicians from the same specialty.

6

COLLABORATION VIA PATIENT- AND PROCESS-ORIENTED UNITS

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ABSTRACT

The complexity of healthcare is increasing, mainly due to the prevalence of multimorbidity in an ageing population. Complex care for patients with multimorbidity requires a multidisciplinary approach. Traditional physician-centered hospital structures do not facilitate the necessary multidisciplinary collaboration. European hospitals are implementing process-based hospital designs with patient- and process-oriented units to stimulate multidisciplinary collaboration. Patient-oriented units are formed based on shared patient groups and focus on care trajectories, while process-oriented units are formed based on having similar processes and focus on efficiency. This study has two aims. First, to study the effect of introduction of these units on multidisciplinary collaboration and perceived impact (efficiency, innovation, and effectiveness). Second, to study whether there are differences between patient- and process-oriented units. A survey-based longitudinal evaluation study was conducted in 2020 and 2022 among physicians in a Dutch hospital to measure multidisciplinary collaboration (relational coordination) and perceived impact (efficiency, innovation, and effectiveness). In addition, open questions were used to enrich the data. Quantitative and qualitative data together suggest that physicians in patient-oriented units notice benefits from the redesign to multidisciplinary units, they perceive higher impact over time. Physicians in process-oriented units achieve a better relationship with the physicians in their unit over time, but they do not perceive impact as high as physicians in patient-oriented units. A process-based design with patient- and process-oriented units is supportive of multidisciplinary collaboration and perceived impact, especially for physicians in patient-oriented units. Physicians in patient-oriented units are positive about the introduction of these units as they feel it contributes to better multidisciplinary patient care. As the results for physicians in process-oriented units may be less directly visible in terms of quality of care, they are less likely to see positive effects, even though their relationships are improving.

INTRODUCTION

Complexity of care has increased because of the high prevalence of multimorbidity in the aging population.[5–8,11] Organizational structures of hospitals have repeatedly been criticized for not being able to respond to the corresponding healthcare demands, due to their focus on medical specialties and their lack of integration.[15,26] Steinmann et al even argue that current structures impede coordination between healthcare professionals, hamper efficiency, and are not suitable for the provision of patient-centered care.[27] Therefore, a redesign of organizational structures seems required to stimulate multidisciplinary collaboration which can be defined as: collaborative work with shared objectives and decision-making responsibilities in which physicians from different medical disciplines work together and address complexity by focusing multiple perspectives on a focused topic in a coordinated manner.[29,30] However, other authors suggest that such a redesign may not be sufficient to guarantee an integrated and collaborative approach across medical disciplines.[16] Redesigns might support an integrated approach by creating opportunities for building relationships, communication, and coordination between medical disciplines, but it might also challenge clinical work and professional relationships by disrupting discipline-based interdisciplinary collaboration.[16]

Traditionally hospitals have been physician-centered organizations, in which structures are built around medical specialties, so-called functional designs.[15,247q] Healthcare professionals with similar specialized skills, expertise, and knowledge are grouped together. These physician-centered organizations seem to facilitate contact and communication among physicians from the same medical discipline and thereby create efficiency.[15,25] At the same time, functional designs do not seem to support collaboration and coordination between physicians from different medical disciplines, which is increasingly required.[27,248] Therefore, in today's hospitals we see reforms towards organizational structures around medical conditions, called process-based, thematic, or care focused designs.[26,27,209] Designs built around patients' needs which group multiple specialties that play a role in a patients' care trajectory.[26,27,31,247] In general, process-based designs are expected to increase quality of care and improve patient-centredness.[7,25,26] However, as most hospitals are reluctant to radically redesign their structures, many hospitals currently combine functional and process-based designs by, for example, only introducing integrated practice units for specific care trajectories, such as oncology.[27,31,209]

Internationally, there are few examples of hospitals opting for a fundamental redesign towards a process-based hospital. The Karolinska hospital is the most well-known example in Europe which completely redesigned their structure based on patient groups that had similar care pathways.[31] This resulted in the organization of care in seven themes (eg, cancer, heart and vascular, ageing, children's and women's health) with an addition of five functions (eg, emergency medicine, intensive care, radiology and imaging) that cut across the themes.[31] A similar example is seen in a Finnish hospital (Turku University Hospital) that restructured into eight care lines (eg, cardiac care, neurological care, children and adolescents) and organized the functions that cut across these care lines into shared service units (eg, pharmacy, emergency services, medical imaging).[249] Six of the introduced care lines in this Finnish hospital had a relatively restricted set of patients, while the other two were containers for treatment processes for which it was not medically or economically feasible to create single care lines.[249] In both examples, there are clearly two distinct units. On the one hand, there are structures based on patient groups, called themes and carelines. In these units, focus is placed on care trajectories (hereafter referred to as patient-oriented units). On the other hand, there are units that have similar processes, called functions and shared service units, in which focus is placed on increasing efficiency (hereafter referred to as process-oriented units). Organizational redesign intends to stimulate multidisciplinary collaboration, but empirical evidence is provided that by redesigning organizational structures also patient satisfaction and financial and operational outcomes can be improved.[28,250] To date, empirical evidence is limited to organizational structures around strategically important patient groups. Differences that can be expected between patient-oriented and process-oriented units remain understudied.[27,28] This study focuses on a Dutch hospital that (in line with the ideas of Karolinska and Turku University Hospital) has opted for a redesign, with patient- and process-oriented units.

New Contributions

Process-based designs are expected to facilitate multi-specialist cooperation by creating opportunities for dialogue, connection, and coordination between physicians.[15,16,28,247] Furthermore, it is known that bringing together individuals from diverse backgrounds can help generate innovative ideas.[251,252] However, different studies suggest that crossing boundaries between disciplines is not guaranteed even when the opportunities are explicitly provided, nor a fast and easy process.[16,28,247] Physicians encounter obstacles such as power imbalances, conflicting views on how clinical protocols should be followed, different perspectives on care (holistic versus specialized), and diverse role conceptions.[16] It is argued that these obstacles are encountered because of differing norms and values that are deeply rooted in professional identities and are difficult to change.[16] This study aims to longitudinally explore the effect of a process-based redesign on col-

laboration between physicians and their ability to improve patient care, with explicit interest in differences between patient-oriented and process-oriented units. There are two research questions proposed: (I) How will the formation of units around patients as well as processes affect (i) multi-specialist collaboration and (ii) the perceived impacts (efficiency, innovation, and effectiveness)? and (II) are there differences between patient- and process-oriented units?

Setting

This research was conducted in a Dutch, so-called, top-clinical hospital. In Dutch healthcare, there are three types of hospitals (general, top-clinical, university) that differ in the care they offer, their expertise, and whether they participate in academic research. A top-clinical hospital is characterized by its role as medical educator and by delivering more complex care and participation in more academic research than a general hospital, but less than a university medical hospital. Most physicians in top-clinical Dutch hospitals are independent, non-salaried workers. They are united in a medical specialist company (MSC), which has a partnership with the hospital. Together with the board of directors, they are responsible for reaching proper agreements about governance of the hospital and care to be provided.

According to previous research, Dutch hospitals are moving away from a structure based on medical specialties towards a more process-oriented design through the development of multi-specialty centers.[27,209] In most hospitals, these changes especially concern specialisms in which the majority of patients suffer from comorbidities and multidisciplinary work is required (eg, oncology, mother and child). Most hospitals choose an incremental change process by stepwise introducing new centers instead of through radical redesign.[27,209] The hospital in our study chose for radical redesign. In May 2019, the organizational structure was changed. The hospital embedded six accountable multidisciplinary units within its structure. Three of these units are based on patient groups, patient-oriented: mother and child; chronic care and frail elderly; oncology; the other three units are based on processes, process-oriented: acute care, planned care, and the diagnostic center. A physician working in the hospital is now part of their own medical specialty group and belongs to one of the six multidisciplinary units. Whereas in the past the focus was on medical specialty group silos, emphasis is now placed on the multidisciplinary units, which is reinforced by formal communication structures, economic accountability at unit level, and dual leadership (business manager and medical manager) at unit level.

Physicians from the same medical specialty group may be embedded within different units. For example, a gastroenterologist may be subspecialized in chronic bowel diseases (eg, Crohn's disease) and therefore be part of the chronic care and frail elderly unit, while another gastroenterologist is subspecialized in gastrointestinal cancer and therefore part of the oncology unit.

METHODS

We conducted a longitudinal evaluation study of the effect of redesign on the collaboration between physicians and perceived impact, by measuring relational coordination and impact (efficiency, innovation, and effectiveness) and asking several open-ended questions. A survey was distributed among physicians at two time points. First, from October to December 2020 and second from October to December 2022. We invited all physicians, from medical specialist to first- year resident to participate (2020: n = 392, 2022: n = 391). Both times an invitation to participate in the survey and multiple reminders were sent via email, with a direct link to the survey. Because the 2020 survey had taught the researchers that response was below 22%, after several reminders and after also providing paper versions, the respondents in 2022 were rewarded with a voucher for a smoothie drink at the hospital canteen. Nevertheless, an extra incentive was needed at the end of 2022 to recruit respondents. Based on the successful experience in 2020, a raffle of bottles of champagne was used as additional incentive. In the data analysis, we included participants who had answered all items of the impact-scale and at least six out of seven items from the relational coordination Measurements.

We decided to conduct our first measurements after the redesign of the hospital structure took shape. Although the new hospital structure was introduced in May 2019, several delays in the process meant that the change did not take shape until the end of 2020. These delays in the process included the fact that the dual leadership positions had not yet been permanently filled. Some interim managers were put in place pending assessment, and it took up to six months to find the right person for the job. In addition, medical specialists installed as medical managers took up to three months to fit their management duties into their schedules. After the installation of these managers, surveys were planned, however then the first cases of COVID appeared in the Netherlands in March 2020. As COVID caused uncertainty, high workload, and pressure, the survey was postponed until the end of 2020. At that point, COVID was not yet gone, but the situation had been contained.

Measurements

In the survey, collaboration between physicians was assessed by the widely used relational coordination scale. Furthermore, items in the survey assessed perceived impact and demographics. The 2022 survey also included four open- ended questions to enhance the richness of the data. These questions focused on changes in collaboration after the hospitals' redesign, the role of the medical specialist group, and potential recommendations to further improve multidisciplinary collaboration.

Relational Coordination

Relational coordination is a concept developed by Jody Hoffer Gittell, which provides an opportunity to map multidisciplinary collaboration.[220] According to the relational coordination concept, effective collaboration is determined by both positive relationships and coordinated interaction between physicians.[220] We used relational coordination as a measure of collaboration between physicians from the same medical specialty groups (eg, pediatrics, internal medicine) and between physicians from different medical specialties working together in a unit (in our study hospital, eg, oncology, acute care). The relational coordination survey is a recommended and frequently used tool in hospital settings for measuring quality of communication and relational ties between professionals.[153,253] Relational coordination is defined as a "mutually reinforcing process of interaction between communication and relationships". Relational coordination was measured using seven survey questions on a 5-point scale (1 = never, 2 = rarely, 3 = occasionally, 4 = mostly, 5 = all the time) at two different points in time (2020 and 2022). The survey has two subscales: a communication sub-scale consisting of four items about communication (frequency, timeliness, accuracy, problem-solving) and a relationship sub- scale consisting of three items about relationships (shared goals, shared knowledge, mutual respect).[253] The relational coordination scores were derived by calculating the mean score, either as a whole or at the level of the subscales. Higher scores indicate better relational coordination, indicating better communication and relational ties.[45,225] Relational coordination has in previous studies shown a Cronbach's alpha between 0.80 and 0.90.25–27 In this study, we found Cronbach's alpha for the relational coordination questionnaire of 0.92 in 2020 and 0.86 in 2022 for the full scale (7 items). The Cronbach's alpha for the communication sub-scale was respectively 0.88 in 2020 and 0.77 in 2022 and for the relation sub-scale 0.86 and 0.77.

Perceived Impact

From an existing (sub-)scale of five items to assess the impact of multidisciplinary collaboration,[30] we used three items to assess the perceived impact of multidisciplinary collaboration. Although not officially labelled as, we refer to this as the impact-scale. The existing scale was developed for a research setting, which shifted from individually ori-

ented towards team-based initiatives focusing on integration of disciplines. We believed this shift in the research setting is comparable to the shift taking place in healthcare. We used the items of the scale as a starting point for formulating a scale that assesses the impact of the team-based initiatives introduced in the studied hospital. We developed a three-item scale to assess the impact of multidisciplinary collaboration. Physicians are asked to evaluate the efficiency of multidisciplinary meetings, the ability of the unit to innovate across specialties, and the general effectiveness of the multidisciplinary unit on a 4-point scale (1 = poor, 2 = fair, 3 = good, 4 = excellent). The three items together provided a Cronbach's alpha of 0.80 in 2020 and 0.71 in 2022.

Other information

The physicians were also asked for some relevant additional information, namely, their gender, their medical specialty, the unit they belong to, their function (eg, medical specialist, resident), the number of years they work in the hospital (ranging from 1, <1 year, to 6, >21 years), and the number of years they work in their current position (ranging from 1, <1 year, to 6, >21 years). As responding to these questions might reveal respondents' identity, an opt-out option was included to avoid dropouts. Furthermore, physicians were asked whether they agreed (ranging from 1, totally disagree to 5, totally agree) with two statements. The first statement was 'I am satisfied with the collaboration between physicians from different specialties within the hospital'. In 2020, a second statement was presented implicitly referring to improvement after the introduction of the new unit structure: "Collaboration between physicians from different specialties within the hospital has improved in the past year". In 2022, a second statement was presented explicitly referring to improvement after the introduction of the new unit structure: "Collaboration between physicians from different specialties within the hospital has improved since the introduction of units".

Analysis

Data collected in a hospital setting might violate the assumption of independence of observations based on group structures (medical specialty group and/or unit), which might require multi-level analysis. As not all physicians from the same medical specialty were in our hospital nested within the same unit, a three-level multilevel analysis was not applicable. Therefore, we conducted the first analysis, the random intercept model, for two-level multilevel analyses with clustering at the level of the medical specialty group and the level of units. These analyses indicated that there were no between-group differences. Therefore, continuing with multilevel analysis was not appropriate and would make the analysis unnecessarily complicated.[235] Statistical analyses were performed with IBM SPSS Statistics version 27. Based on the small sample size and use of Likert-scales it was decided to use non-parametric techniques. Mann Whitney

U-tests were performed to compare the process-oriented and patient-oriented units, in 2020 and in 2022, and to compare the results of 2020 and 2022. Furthermore, Wilcoxon Signed Rank tests were used to compare matched pairs over time (2020 and 2022). Finally, as no non-parametric alternative was available, we used mixed between-within subject ANOVAs to assess whether there were differences between patient-oriented and process-oriented units over time (2020 and 2022).

The qualitative data provided by the answers to the open-ended questions were inductively coded using a thematic analysis.[254] First, we familiarized ourselves with the available data by closely reading all the answers. Then, we divided the data into two groups, namely the answers from respondents in patient-oriented units and the answers from respondents in process-oriented units. Then for each group, open coding was used to analyze the answers to each question and identify themes. These themes and a comparison between the two groups were used to enhance the richness and interpretation of the quantitative data.

Ethics

The Ethics Review Board decided that our study was outside the scope of the Netherlands' medical research involving human subjects act, especially as the study focused on professionals instead of patients (METC-LDD-2019-Z19.010). Respondents were informed of the purpose of the study and participation in the survey was entirely voluntary. Participants were informed and consented that their responses would be used in this study and could be published in an anonymized fashion, that all identifiable information would be removed to protect their privacy, and that responses would not be presented in a manner that could be traced back to any individual (informed consent).

RESULTS

In 2020, 27% of the invited physicians responded to the survey (93/392), in 2022, 28% (109/391). Fifteen of the physicians that had responded to the survey in 2020 were no longer employed in the study hospital in 2022, leaving us with seventy- five physicians able to participate at both times. In total, thirty-four physicians participated in the survey both in 2020 and 2022. In 2022, more woman (n = 66, 61%) than men (n = 39, 36%) responded to the survey, while in 2020 an almost even number of woman (n = 45, 48%) and men (n = 43, 46%) responded. Most respondents in both years were medical specialists n = 73 (79%) and n = 85 (78%) in 2020 and 2022, respectively. The histograms below (see Figure 6.1) shows the percentages of (all) respondents' (2020: n = 93, 2022: n = 109) agreement with two statements, satisfaction with and improvement of collabora-

tion across specialism boundaries. The left histogram shows that most respondents in both years are satisfied with collaboration across specialism boundaries (>70%). The right histogram shows that in 2020 a relatively small percentage of respondents (~10%) disagreed that the introduction of the units let to improvement, while almost 30% did agree on this matter. This changed in 2022, where only a small percentage of respondents (~10%) agreed that the introduction of the units let to improvement, while more than 30% disagreed on this matter.

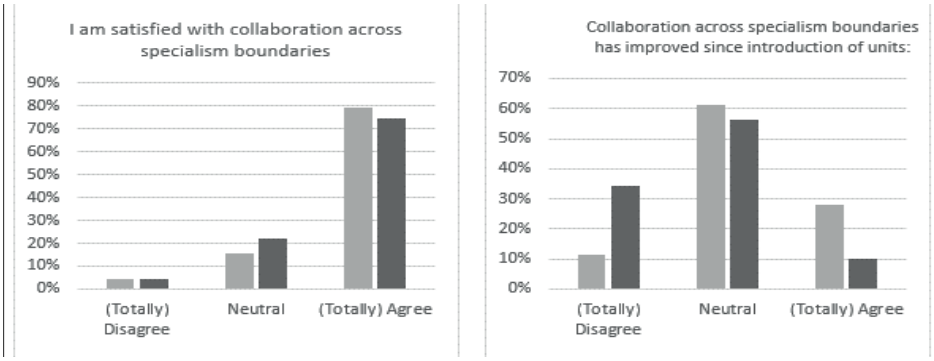

Figure 6.1. Histograms. Agreement with statements on multidisciplinary collaboration

Comparisons between patient-oriented and process-oriented units

Mann–Whitney *U*-tests were conducted to compare the patient-oriented and process-oriented units on relational coordination and the impact on the healthcare process (see Table 6.1). In 2020, there were no differences between patient- and process-oriented units in relational coordination nor on the impact on the healthcare process. In 2022, nonsignificant differences between patient-oriented and process-oriented units were shown in relational coordination, but a Mann–Whitney *U*-test revealed a larger impact on the healthcare process of patient-oriented (Md = 2.67, n = 57) compared to process-oriented units (Md = 2.33, n = 47) units, U = 924, z = −2.77, p = 0.006, r = 0.27. This would be considered a small-to-medium effect size using Cohen's (1988) criteria of 0.1 = small effect, 0.3 = medium effect, 0.5 = large effect.

Table 6.1. Comparisons between patient-oriented and process-oriented units

	Group	n	Median	*U*	*z*	*p*
2020						
Relational Coordination Specialism	Patient-oriented	52	4.43	1075	0.07	.947
	Process-oriented	41	4.43			
Relational Coordination Unit	Patient-oriented	52	4.00	893	-1.35	.178
	Process-oriented	41	3.86			
Impact	Patient-oriented	52	2.67	1045	-0.17	.868
	Process-oriented	41	2.67			
2022						
Relational Coordination Specialism	Patient-oriented	57	4.50	1362	0.08	.937
	Process-oriented	47	4.57			
Relational Coordination Unit	Patient-oriented	57	4.00	1189	-0.99	.321
	Process-oriented	47	4.00			
Impact	Patient-oriented	57	2.67	924	-2.77	.006
	Process-oriented	47	2.33			

Comparisons between 2020 and 2022

Responses from 2020 to 2022 were compared using Mann–Whitney *U*-tests (see Table 6.2). Only one significant difference between 2020 and 2022 was shown. The relationships between physicians from the same medical specialty group scored better in 2022 (*Md* = 4.67, n = 104) than in 2020 (*Md* = 4.33, n = 93), *U* = 5931, z = 2.75, *p* = 0.006, *r* = 0.19.

In addition, analyses were conducted to compare responses from 2020 to 2022 separately for patient-oriented and process-oriented units (see Table 2). For patient-oriented units, no significant differences between 2020 and 2022 were shown. For process-oriented units, two significant differences were shown. First, the relationship scores between physicians from the same medical specialty group increased from 2020 (*Md* = 4.33, n = 39) to 2022 (*Md* = 4.67, n = 47), *U* = 1195, z = 2.49, *p* = 0.013, *r* = 0.27. Second, the relationship scores between physicians from different medical specialties increased from 2020 (*Md* = 3.83, n = 40) to 2022 (*Md* = 4.00, n = 45), *U* = 1159, z = 2.33, *p* = 0.020, *r* = 0.24.

Table 6.2. Comparisons between 2020 and 2022

All respondents	**Year**	**n**	**Median**	***U***	***Z***	***p***
Relational Coordination Specialism	2020	93	4.43	5617	1.33	.183
	2022	109	4.57			
Subscale – Communication	2020	88	4.50	4257	-0.15	.879
	2022	98	4.50			
Subscale - Relationship	2020	90	4.33	5931	2.75	.006
	2022	108	4.67			
Relational Coordination Unit	2020	93	3.86	5604	1.30	.194
	2022	109	4.00			
Subscale – Communication	2020	89	4.00	4640	0.64	.523
	2022	99	4.00			
Subscale - Relationship	2020	91	4.00	5479	1.93	.053
	2022	104	4.00			
Impact	2020	93	2.67	5084	0.04	.970
	2022	109	2.67			
Patient-oriented units						
Relational Coordination Specialism	2020	52	4.43	1649	1.02	.308
	2022	57	4.50			
Subscale – Communication	2020	47	4.50	1225	0.19	.848
	2022	51	4.50			
Subscale - Relationship	2020	51	4.67	1657	1.47	.141
	2022	56	4.67			
Relational Coordination Unit	2020	52	4.00	1560	0.47	.637
	2022	57	4.00			
Subscale – Communication	2020	49	4.00	1282	0.05	.959
	2022	52	4.00			
Subscale - Relationship	2020	51	4.00	1490	.558	.577
	2022	55	4.00			
Impact	2020	52	2.67	1683	1.24	.214
	2022	57	2.67			

Process-oriented units						
Relational Coordination Specialism	2020	41	4.43	1046	0.69	.489
	2022	47	4.57			
Subscale – Communication	2020	41	4.50	796	-0.61	.544
	2022	42	4.50			
Subscale - Relationship	2020	39	4.33	1195	2.49	.013
	2022	47	4.67			
Relational Coordination Unit	2020	41	3.86	1129	1.39	.165
	2022	47	4.00			
Subscale – Communication	2020	40	3.75	924	0.79	.429
	2022	42	4.00			
Subscale - Relationship	2020	40	3.83	1159	2.33	.020
	2022	45	4.00			
Impact	2020	41	2.67	818	-1.24	.214
	2022	47	2.33			

Paired comparisons

Only for a small sample (n = 34) data at two time points were available, for which Wilcoxon Signed Rank tests were performed (see Table 6.3). These Wilcoxon Matched Pairs Signed Rank Tests revealed only one statistically significant change from 2020 to 2022. The Wilcoxon Signed Rank Test revealed a statistically significant improvement of the relationship between physicians from different medical specialties, z = 2.25, n = 30, p = 0.024, with a medium effect size (r = 0.41). While the median scores on the relationship sub-scale of relational coordination are equal to 2020 (*Md* = 4.00) and 2022 (*Md* = 4.00), suggesting that there is a significant difference in the distribution of paired observations but not in the central tendency (median).

Table 6.3. Wilcoxon Matched Pairs Signed Rank Tests

	Md (2020)	*Md* (2022)	N	z	*p*
Relational Coordination Specialism	4.64	4.57	34	-0.16	.870
Subscale - Communication	4.50	4.50	26	-0.76	.448
Subscale - Relationship	4.67	4.67	32	0.22	.825
Relational Coordination Unit	3.79	4.00	34	0.97	.331
Subscale - Communication	3.75	3.88	28	-0.10	.922
Subscale - Relationship	4.00	4.00	30	2.25	.024
Impact	2.67	2.67	34	0.38	.702

In addition, as no non-parametric test is available,[255] we performed mixed between-within subject ANOVAs to tell whether the change over time is different for patient-oriented compared to process-oriented units (interaction effect) on participants' scores for relational coordination and perceived impact (see Table 6.4). For participants' scores on perceived impact, there was a significant interaction between unit-base and time, Wilks' Lambda = 0.88, F (1, 32) = 4.26, p = 0.047, partial eta squared = 0.12. The plotted results (see Figure 6.2) show an increase from 2020 to 2022 for patient- oriented units, but a decrease from 2020 to 2022 for process-oriented units. The other analysis revealed a similar picture to the Wilcoxon Matched Pairs Signed Rank tests, with no significant interaction effects, and only a substantial main effect of time for the relationship between physicians from different specialties within the same unit, Wilks' Lambda = 0.80, F (1, 28) = 6.88, p = 0.014, partial eta squared = 0.20.

Table 6.4. Scores for the patient-oriented and process-oriented units at two points in time

		Patient-oriented			**Process-oriented**		
Variable	Year	*n*	*M*	St. Dev.	*n*	*M*	St. Dev.
Relational Coordination Specialism	2020	21	4.54	0.40	13	4.60	0.44
	2022	21	4.61	0.28	13	4.45	0.45
Subscale – Communication	2020	16	4.56	0.37	10	4.65	0.49
	2022	16	4.58	0.35	10	4.40	0.41
Subscale – Relationship	2020	20	4.60	0.38	12	4.53	0.50
	2022	20	4.65	0.33	12	4.50	0.44
Relational Coordination Unit	2020	21	3.96	0.69	13	3.69	0.46
	2022	21	4.03	0.45	13	3.85	0.45
Subscale – Communication	2020	17	3.88	0.72	11	3.77	0.53
	2022	17	3.94	0.41	11	3.75	0.57
Subscale – Relationship	2020	19	3.98	0.72	11	3.55	0.48
	2022	19	4.16	0.42	11	4.00	0.42
Impact	2020	21	2.48	0.66	13	2.46	0.48
	2022	21	2.68	0.49	13	2.23	0.52

Qualitative results

In 2022, respondents were also asked four open-ended questions. Sixty-five respondents (40 from patient-oriented units and 25 from process-oriented units) answered these questions. Several topics emerge from their answers. These provide insights into the changes following the implementation of the new organizational structure. Although at first sight there are many similarities in the answers given by respondents, a closer examination reveals differences between physicians from patient- and process-oriented units. Most importantly, the qualitative results provide more nuance and context for interpreting and discussing the survey results.

Changes in cross-specialty collaboration

Positive and negative changes in the collaboration between physicians from different specialties after the introduction of the new units are mentioned by the respondents. Positive changes mentioned relate to shared responsibility, having a common goal, and more cross-specialism meetings. In contrast, other respondents claim that they are spending more time on cross-specialism meetings that do not bring many benefits. In their view, although consultation structures have changed, this did not affect their day-to-day patient care practice much, nor did it lead to improved integration.

Some respondents also suggest that collaboration is not necessarily linked to the organizational structure. Collaboration with physicians from some specialisms goes well, while collaboration with other specialisms is difficult, independent of the prevailing structure.

> *As an oncologist, you are constantly working with all the other medical specialists involved with patients with oncologic conditions, and this is reflected in all daily multidisciplinary consultations we have with all these involved colleagues. - Respondent from a patient-oriented group*

> *With some specialties cooperation goes very well, with others less so. - Respondent from a process-oriented group*

Physicians from patient-oriented units seem mostly positive about the changes made but they see room for improvement. They mention that some specialties are assigned to units where they do not fit that well, while others are assigned to a specific unit, while they mostly work across units. In contrast, respondents from process-oriented units that responded to the open questions seem mostly negative, and even frustrated.

They state that they are not being heard enough by management and that decision-making power is misallocated. Some even experience the changes as an intervention designed by management without really listening to what is needed in practice.

> *Regarding the units, which is a variation on a theme and in my opinion that has nothing to do with whether you work together more efficiently or not, that is again typical managerial thinking. - Respondent from a process-oriented group*

Role of the medical specialty group

In the former hospital design, the medical specialty groups played a vital role. In the new design that role might change as the structure is no longer built around medical specialties. Only a few respondents see a clearly different role for medical specialty groups in the future and suggest that the current role inhibits multidisciplinary collaboration. However, these respondents do not define what the new role would be, or how it should be reached. Especially, respondents from the process-oriented units emphasize the fact that the medical specialty group is nowadays still the most important entity in the provision of care.

> *The role of the medical specialty group must remain! It is the entity for solving organizational problems as well as problems related to medical content in daily work. By remaining organized as a medical specialty group, there is also a good possibility to maintain different expertise within a specialty group. - Respondent from a process-oriented group*

Similar but more nuanced, respondents from the patient-oriented units emphasize the practical necessity of the medical specialty group for quality reviews, education, planning, and connection.

> *It is good to organize care around the patient. As a result, as a caregiver, you may have more contact with colleagues from the care team than with your colleagues from the specialty group. We are not yet ready to abolish the medical specialty group. Things like schedules, vacations, and shifts are arranged through the medical specialty group. But things around patient care such as protocols, processes, care paths must be arranged by the care team. And that is sometimes quite difficult and takes time, needs to be made time for. - Respondent from a patient-oriented group*

Improving cross specialty collaboration

While general respondents seem satisfied with the collaboration between different specialties, they do offer suggestions for improvement. They especially stress that culture (eg, implicit hierarchy) and underlying structures (eg, quality and education) must change to truly focus on multidisciplinarity. Physicians see opportunities for improving collaboration by strengthening the relationship between different specialties and creating greater mutual understanding, for example, by doing team-building activities or participating in a shift of another specialty. In general, to improve multidisciplinarity respondents feel that the voice of physicians is paramount and there should be more room for medical leadership. The professionals on the work floor need to be heard as they play a key role in change.

> *Improving mutual understanding, eg by looking at each other in practice. - Respondent from a process-oriented group.*

> *Reducing the current tensions between management and medical staff, sometimes a bit of give and take, dialogue rather than Discussion, will help to free up energy and time for inter-physician collaboration. - Respondent from a patient-oriented group.*

DISCUSSION

Internationally, a shift is seen from hospitals organized around specialties towards more process-based hospitals, focusing on patient groups.[26,27,209] Two distinct types of units can be distinguished within these process-based hospitals, namely patient-oriented and process-oriented units. With the current study, we aimed to generate insights about the effect of the introduction of patient-oriented and process-oriented units on multispecialist collaboration and impact (effectiveness, efficiency, and innovativeness). The results of our study as discussed below should be interpreted with caution. First, because the study included only one hospital and only 100 physicians per wave. Second, we only look at collaboration from the physicians' point of view.

The qualitative data suggest that mostly physicians in patient-oriented units perceive benefits from an organization based on multidisciplinary units. The quantitative results provided some support, but we did not find that the relationships with physicians from other specialties improved over time. This might be related to the fact that these physicians already worked together intensively.[250] However, the qualitative results show that these physicians do acknowledge the relevance of the structural changes. Furthermore, they also experience a greater perceived impact (in 2022) than physicians in process-ori-

ented units. In the patient-oriented units, physicians from different medical disciplines are grouped together around the patients they treat (eg, oncology).[16,25] As this involves primarily patients that require a multidisciplinary approach, the direct relevance of the new structure for improving quality of care seems clear. Therefore, these changes are very much in line with physicians' professional logics and interests.[256,257]

In contrast, physicians in process-oriented units did experience better relationships with physicians from other specialties, as is shown by the quantitative results. In addition, there is an indication that the relationship with physicians from their own specialty group also improved. However, that did not result in more perceived impact. Also, physicians from process-oriented units noticed few changes since the introduction of the new structure and emphasize that they now spend more time on meetings that bring no immediate benefits (qualitative results). In the process-oriented units, different medical specialties are grouped together because they are part of similar processes and share resources (eg, acute care, planned care).[25,247] These structures cater more directly to managerial logics and interests related to efficiency, then to professional logics related to quality of care.[258] In our view, this could possibly explain differences in perceived impact and experienced relevance. In patient-oriented units, there is a clear opportunity to improve multidisciplinary care (make impact), while in process-oriented units quality of care might not necessarily improve, despite more coordination (improved relationships with other specialties) or better use of resources.

The qualitative results of this study also show that despite the need for multi-specialty integration of care, respondents still see a significant role for the medical specialty group. The medical specialism is still a delineated group that is important for education and training, assessment of quality, specialization, research, and division of work. Through historical practices and patterns physicians' professional identities have also largely been shaped around their medical disciplines.[258] Many authors agree that these professional identities need to change or expand to support multidisciplinary collaboration. Some authors suggest that dissolving the medical specialty group is required for this.[250,258] Others suggest that medical specialty group can be maintained and serve as solid foundation while opening up to organizational logics of multidisciplinarity.[216,259,260]

A final important nuance raised by the respondents is that multi-disciplinary cooperation is not only dependent on the prevailing structure but also on existing interprofessional relationships. In our earlier studies, we suggested that professional domains and autonomy are of influence.[80,81] Especially when professional domains (partly) overlap, multidisciplinarity can result in a complex situation where professionals experience competition.[257] Rivalry might emerge from shortages in healthcare personnel

and resources, domain conflicts, as well as from unclarity about who is accountable, unpredictability of the situation, or lack of common understanding.[257,261] In summary, it seems that the intrinsic factor of improving quality of care for multimorbid patients drives physicians towards multidisciplinary collaboration, but external factors such as resources and incentives lead to competition.

Limitations

The study presented has its shortcomings, and findings must be interpreted with caution. First, we need to recognize that we compare data collected in 2020 and 2022. In the meantime, there has been a pandemic that has put excessive pressure on healthcare. Other researchers found the pandemic to have a positive effect on interdisciplinary collaboration across departmental boundaries.[212,213] This might have biased our results. Second, despite trying to take into account the limited time of our respondents by limiting the number of questions in the questionnaire, reaching out to them multiple times, and rewarding participation we are dealing with response rates of 27% (in 2020) and 28% (in 2022), and a sample of n = 34 respondents that participated both in 2020 and 2022. Therefore, our results might not reflect all physicians and decrease generalizability.

Despite the small sample, our sample represents a variety of medical specialties, units, experience on the job, and gender representing the diversity of the physician workforce within a hospital. In addition, the average response rate among physicians is known to be lower than in other target groups.[262] The trade-off between questionnaire length and the use of validated items resulted in the use of a relatively small number of items to measure perceived impact. Although impact has not been measured in this way before, it presents an acceptable Cronbach's alpha within this study. In addition, to enhance interpretation of the results, open-ended responses were used.[263,264] These responses provide the opportunity to uncover more sensitivities and enrich the interpretation.[265] Despite the limitations and recommendations for future research, the strength of this study is that it contributes to current scientific and practical debates on integration in healthcare and reveals relevant insights on collaboration between physicians from different medical disciplines.

Despite the added value of this study, the debate on integration of care and restructuring is broader than collaboration between physicians and offers opportunities for future research on how restructuring within a hospital is embedded in the wider healthcare system. For example, will redesign of a hospital affect its connection with primary care institutions, will it lead to different reimbursement of physicians, how will it affect competition within and across hospitals, and what can medical schools do to prepare students to work in these new structures.

Conclusion

The introduction of patient-oriented units (based on shared patient groups, focus on care trajectories) and process- oriented units (based on similar processes, focus on efficiency) has impact and influences inter-physician collaboration. Patient-oriented units are perceived positively by physicians, especially in terms of improving multidisciplinary care for complex patients. In contrast, process-oriented units show improvements in relationships between physicians but may not necessarily have an impact multidisciplinary care. In addition, while emphasizing the need for multidisciplinary collaboration, this study highlights the importance of the medical specialty group, which should be seen as a necessary condition for education and training purposes. However, given the limitations of the study, including the relatively small sample size and research in one single center, the results should be interpreted with caution.

7

CONLUSIONS & DISCUSSION

The current healthcare system seems not adequately equipped to keep care accessible, affordable, and of high quality under the circumstances of increased and more complex care-demand. This calls for changes by organizations and physicians that reduce fragmentation and increase collaboration between medical specialties. Specialization provided hospitals and physicians with a certain focus in education and structure, which has proven added value for innovation and development of healthcare in the past. Nowadays, care built around medical disciplines is criticized and it is argued that the gap between different disciplines should be reduced. This has led to the overall aim of this thesis to better understand the effort in and by hospitals to reduce care fragmentation, specifically by examining how clinical leadership and organizational changes within hospitals contribute to inter-physician collaboration across the boundaries of the specialism. In the following section we will answer our sub-research questions. Based on these answers we present an in-depth discussion and formulate a response to our central research question: *How do clinical leadership and organizational changes within hospitals contribute to inter-physician collaboration?*

How are hospital designs evolving in the current context to support inter-physician collaboration?

In the past hospitals have followed a logic of organizing care around medical specialties such as neurology and cardiology to focus on specialization of medical disciplines. In response to changing healthcare demands (higher prevalence of multimorbidity) hospitals are now encouraged to follow a logic of organizing care around patient conditions (e.g. cancer, cardiovascular) or care types (e.g. chronic, acute) emphasizing a multi-specialty approach. The urgency of change towards more cross-specialism collaboration is visible in our results, which show that hospitals in the Netherlands are slowly evolving towards hybrid designs, using combinations of the design logics. Most hospitals do not choose a radical redesign towards completely organizing around patient conditions but are moving towards hybrid designs by introducing coordination mechanisms (based on value-based healthcare or lean principles) within their more traditional structures to support a multi-specialty approach. In fact, smaller hospitals find these coordination mechanisms sufficient for a multi-specialty approach and do not see the need for a radical redesign.

The main drivers for this evolution are a shared ideal that organization care around patient conditions and care types lead to better care quality and cost containment, and normative pressures from within the healthcare sector. Professionals want better collaboration across disciplines and specialties, less fragmentation, and more integration, but it is less clear what changes will get them there. As a result, there is a preference for incremental rather than radical change. For these incremental changes on the one hand, hospitals are very much looking at each other for direction. On the other hand, there are

also hospital-specific factors of great influence, namely, past decisions and choices, current structures, and the stability and vision of the dominant coalitions (physicians and board of directors). If we take a closer look, it seems that hospitals with a stable hospital board and a visionary leader dare to put radical change on the agenda. Finally, although authors such as Porter[77] often argue that the creation of a competitive advantage is a driver for change, our research shows that competition is not a driver for redesign in hospitals in the Netherlands. Instead, hospitals are looking to collaborate and partner with other hospitals.

In short, the international trend of organizing care around patient conditions and care types (process-based design) is reflected in Dutch hospitals. These changes are being introduced to encourage multidisciplinary collaboration between physicians from different medical specialties. Often by taking incremental steps rather than making radical changes.

What is known in academic literature on collaboration between physicians from different medical specialties in a hospital setting?

The focus on integration of care creates the need for cross-specialty collaboration. This need is recognized in grey literature but is underrepresented in academic literature. The shortcoming in academic literature on collaboration in healthcare is that physicians are often presented as a homogeneous group. The review we conducted confirmed that physicians have specialty-bound characteristics, such as the use of specialty-specific language. This reaffirmed our view that we need to pay more attention to interdisciplinary collaboration between physicians, as they should be considered a heterogeneous group. The lack of literature on this subject provides many opportunities for research and for research to contribute to practice.

Besides the confirmation that not all physicians are the same, the review resulted in insights on the effects of physician collaboration, what factors influence physician collaboration, and what instruments are used to measure physician collaboration. Although the evidence is limited, we found mostly positive results of collaborative practice between physicians, such as increased patient and staff satisfaction and reduced length of stay, error rates, and hospital costs. Important evidence was found that physicians believe that inter-physician collaboration will lead to better patient care. Despite the belief in and necessity of inter-physician collaboration physicians encounter obstacles of various kinds when collaborating with others. These can be personal preferences (e.g. need for autonomy) and characteristics matching their medical specialism (e.g. position on hierarchical ladder, existence of overlapping professional domains), but also organi-

zational elements (e.g. communication structures, physical proximity) and contextual factors (e.g. type of practice). So, many factors influence collaboration between physicians. Besides a wide variety of factors affecting collaboration, also a wide variety of instruments are used to measure collaboration. Yet, there are three focus points that are measured: information transfer (type of information shared and understanding by other party), social ties (frequency of contact, frequency of certain behaviors expressed, tone of the relationship), and value judgements (quality and satisfaction). Remarkably none of the studies referred to relational coordination (theory or measurement) that captures frequency and relational dynamics and is often used in studies on interprofessional relationships.

In short, physicians encounter obstacles such as conflicting views on how clinical protocols should be followed, they experience power imbalances accompanied with behaviors that do not promote multidisciplinary collaboration, and physicians can also have different perspectives on overlapping domains. These obstacles strongly relate to differing norms and values that are deeply rooted in professional identities. Next to these obstacles, they must deal with contextual factors (e.g. hospital structures, incentives) that are not always conducive to multidisciplinary collaboration.

Research context

We have shown developments in Dutch hospitals, as well as the international state of the art with regard to the collaboration between physicians across the boundaries of medical specialties. In the remainder of our research, we aimed to better understand inter-physician collaboration across the boundaries of specialism, by studying the role of physicians in reducing care fragmentation, as well as the effect introducing supporting structures. The answers to the first two sub-questions showed that one of many factors influencing inter-physician collaboration is the context in which collaboration takes place and that choices made by hospital boards are also dependent on various factors (including size and past decisions). Therefore, we consider it important to give a brief description of the hospital in which the remainder of our research has been conducted. This hospital has implemented structures representative of the international trend towards process-based structures.

The Netherlands has 7 academic hospitals and 98 general hospitals of which 27 have a top-clinical status. Top-clinical means that the hospital is demonstrably distinctive for some pathologies compared to regular healthcare based on objective criteria. Another difference is that specialty training is provided in top-clinical hospitals, but not in general hospitals. The studied hospital is one of the twenty-seven top-clinical hospitals.

The hospital is a medium-sized hospital in the Netherlands, but relatively small by international standards. In 2019, a redesign of the internal structure was introduced. With in mind the changes introduced in the Karolinska Institutet, the hospital introduced five accountable multidisciplinary entities, namely: mother & child, chronic care & frail elderly, oncology, acute care, and planned care. Whereas in the past focus was on medical specialty groups, emphasis is now placed on these multidisciplinary entities. Economic incentives, communication structures and dual leadership on the level of these multidisciplinary entities emphasize multidisciplinarity. The introduced entities can be divided into two distinct categories. On the one hand there are new structures based on patient groups (mother & child, chronic care & frail elderly) which cater directly to professional logics related to quality of care. On the other hand, there are structures based on similar processes and shared resources (acute care, planned care) that cater more towards managerial logics and interests related to efficiency.

In short, the trend to put more focus on multidisciplinary care by introducing process-based structures is implemented in this hospital, with a distinction between patient-oriented and process-oriented units.

How do clinical leadership behaviors correlate with multidisciplinary collaborative behaviors?

Professionals, specifically physicians, are expected to take initiative to increase integration and inter-physician collaboration. Part of this expectation is that they fulfil a clinical leadership role. A clinical leader is a healthcare professional who is directly involved in clinical care and continuously puts effort into the improvement of care and inspires and motivates others to do the same. Part of this clinical leadership role is building bridges between medical disciplines. While our focus is on the clinical leadership role of physicians, there is also increased attention to clinical leadership roles of nurses. In our survey-study, we investigated the impact of clinical leadership on collaborative behaviors of both physicians and nurses and compared physicians' and nurses' clinical leadership behaviors.

The results of our research indicate that physicians and nurses show a similar amount of clinical leadership behaviors. However, physicians are more likely to perceive themselves as clinical leaders in practice than nurses. It demonstrates that self-perceived clinical leaders who exhibit behaviors like having deep dialogues with peers (both nurses and physicians) are more likely to express multidisciplinary collaborative behaviors and, as such, act as bridge-builders. Physician clinical leaders show more positive attitudes and behavior towards physicians from other specialties and show stronger connections with

physicians within their own and with physicians from other specialties. Clinical leaders in nursing show better communication and relationships with physicians.

What associations exist between clinical leadership, relationships between physicians, and outcomes such as job-satisfaction and physicians' reported quality of care?

Physicians adopting a clinical leadership role positively influence collaborative behaviours. We also wanted a deeper understanding of how clinical leadership relates to relationships and outcomes. The review provided some general insights regarding collaboration between physicians and outcomes. Collaboration between specialisms in complex situations appears beneficial for patients. In addition, collaboration leads to a sense of competence for future collaboration and a decrease in costs of hospitalization. Next to the review the conducted research showed that physicians who express more clinical leadership behaviour report being more satisfied with their job, while not perceiving a higher workload. Furthermore, it was shown that this relationship is mediated by strengthened relationships and coordination with physicians from the same specialism as well as with physicians from other specialties. Our findings indicate a sequential mediation, clinical leadership strengthens relationships and coordination with physicians from the same specialism which consecutively strengthens relationships and coordination with physicians from other specialties. Which ultimately leads to increased job satisfaction. Lastly, only strengthened relationships with physicians from the same specialism led to higher perceived quality of care.

How does organizational change impact multidisciplinary collaboration and perceived impact in terms of efficiency, innovation, and effectiveness?

In addition to outcomes such as physician satisfaction and quality of care, the outcomes of collaboration between physicians can also be approached in terms of efficiency, innovation, and effectiveness. Our review showed that organizational structures and procedures influence inter-physician collaboration. Furthermore, we learned that hospitals are introducing patient- and process-oriented units to promote multidisciplinary collaboration. The idea behind is to increase efficiency, innovation, and effectiveness. Finally, we provided insights into the connection between these.

For patient-oriented units we found no significant changes in quantitative results on the relationships between physicians from different specialties over time. However, qualitative results showed that physicians in these units appreciate the structural changes and acknowledge their relevance. Furthermore, they also experienced a positive change in the impact they were able to achieve in terms of efficiency, innovation, and effective-

ness in multidisciplinary care. In contrast the quantitative findings in process-oriented units showed improved relationships between physicians from different specialties, but they did not experience changes in the impact they were able to achieve. The qualitative results showed that physicians in process-oriented units noticed few changes after the introduction of these units and emphasized that they now must spend more time on meetings that bring no immediate benefits.

Other results that emerged from the (qualitative) study on the impact of introducing patient- and process-oriented structures highlight that multidisciplinary collaboration does not depend only on these newly introduced units (organizational structures). This had also emerged from the review, which showed that many factors have an influence on multidisciplinary collaboration. In addition, it was also stressed that despite the need for multidisciplinary collaboration, the medical specialty continues to have an important role. This supports our earlier results that, when seeking multidisciplinarity, it is also needed to retain monodisciplinary groups.

DISCUSSION

We started by emphasizing the key role of physicians and hospitals in tackling modern healthcare challenges related to increased life expectancy and multimorbidity. Integration and coordination among different medical specialties are vital for comprehensive care yet remain insufficiently explored. We observed a shift in hospital design from specialty-focused to a patient- oriented design, aiming to enhance care quality and efficiency. In this shift incremental changes are preferred over radical redesigns, due to the complexity of organizational transformations. We observed these organizational changes having promising results to support inter-physician collaboration. Furthermore, we showed that embedding the informal clinical leadership role into the professional practices of physicians as well as nurses is promising to promote collaboration between physicians from different specialties. While clinical leadership behaviors are also associated with increased job satisfaction and fosters relationships with peers.

Authors claim that the best approach to increase integration is to move away from discipline-based care, towards an approach focused on multidisciplinary teams and patient groups.[16,28] Consistent with this approach, some stakeholder, express the thought of dissolving monodisciplinary medical specialties to increase integration.[32,33] However, our research emphasized the importance of the existence of the monodisciplinary medical specialism as a stable basis for interdisciplinary collaboration.

This contradiction between focus on mono- and interdisciplinarity is our starting point for an in-depth discussion at different levels in healthcare on balance. Finding a balance at the individual, group, and hospital level. At the individual level we focus on the individual role of the physician and the balance between clinical practice and clinical leadership. At the group level the emphasis will be on medical disciplines and their balance between mono-and interdisciplinary collaboration. Finally, we will discuss how changes in hospital structure can facilitate interdisciplinary collaboration, and we will highlight suggestions that aim to increase interdisciplinary collaboration in healthcare and add a necessary nuance to these initiatives.

The balancing act between clinical practice and clinical leadership

> *"Are we telling physicians they all need a title? No, we're not. All physicians need to be leaders, whether or not they have a formal title. Physicians in every area of medicine have opportunities to lead right now… There are a few, necessary, titled positions, but there are countless ways to lead in everyday practice and to share the opportunity to lead in team-based health care." (CanMEDS report, 2015: 4)*

Physicians experience an increased imperative to work across professional boundaries in the future as patients suffering from multi-morbidity continue to increase.[4,5,10] This requires physicians to provide care, but also act as clinical leaders to work across professional boundaries and organize and improve care delivery. The combination of (clinical) leadership and clinical work is seen as the ideal modern physician, but not yet self-evident. The modern physician needs to balance the traditional role of clinician with the new role as bridge-builder, negotiator of care plans, and initiator of innovation.

Noordegraaf[34] argues that merging roles of leadership and clinical work is about balancing two logics. The professional logic, referring to the protected treatment of complex cases based on autonomy, authority and expertise, is also named professionalism. And the managerial logic, based on organizational principles and values such as efficiency and satisfying patients also named managerialism.[34] Intertwining professionalism and managerialism in everyday practice does not mean that all contradictions are resolved. Rather than separating professional action from concerns about efficiency and costs, it is becoming common practice to deal with them simultaneously. The challenge of incorporating managerial logic is the framing of physicians as (informal) leaders that comes with it.

Framing physicians as leaders is seen as something to strive for, something that improves health care.[266] In this thesis we focused on an informal leadership role that can be

taken without having to hold a formal leadership position: clinical leadership. Clinical leadership has positive effects for collaborations between physicians from different specialisms and is therefore expected from every physician. However, framing every physicians as leader may lead to a group of physicians who see the leadership frame as an opportunity to protect their autonomous position in healthcare and reduce the role of non-physicians (management).[35] Reducing influence of management and managerialism might lead to reduced attention to activities that are not typical of the medical field, such as finance, strategy, innovation, and staff management. Instead, professionalism and physicians' medical background might prevail in decisions. Insufficient balance between managerial and professional perspectives might lead to suboptimal decisions or even conflicts. Excessive focus on managerialism might lead to neglect of individual needs of patients and lead to sub-optimal care outcomes. Excessive focus on professionalism might lead to a struggle to manage teams and resources effectively. Furthermore, when too many physicians assume a leadership role it can lead to conflicting directives, which can hinder decision-making processes, and it can be unclear who holds ultimate responsibility and authority resulting in misalignment.

From a competence perspective, the concept of T-shaped professionals – a concept used in broader health and social care – describes that merging roles of being a bridge-builder (which is part of being a clinical leader) and clinical work is about combining different abilities. Profession-specific abilities, such as the possession of in-depth knowledge in a specific area, represented by the vertical bar of the T-shape metaphor.[267] And profession-general abilities and knowledge to be able to understand, relate to, and adapt to others across domains, represented by the horizontal bar of the T-shape metaphor.[267] According to the theory of T-shaped professional, a physician capable of combining these abilities should be able to tackle complex problems that require an interdisciplinary approach based on their in-depth knowledge and their ability to collaborate with people with other specialized knowledge based on their general abilities.

Once again, there is a risk of suboptimal care when too much focus is placed on one of the two. In current healthcare, there seems to be too much focus on specialized knowledge, resulting in insufficient integration of care. On the other hand, too much focus on integration can lead to superficial knowledge at the expense of in-depth expertise. This is something that medical professionals taking on a clinical leadership role should be wary of. Besides, when focused on integration everyone in the interdisciplinary group needs the general abilities to understand others. If not, trying to motivate and convince those who have not developed these abilities could potentially lead to tension and interpersonal conflict.

Despite the potential challenges we conclude that physicians should be motivated to adopt the clinical leadership role to build bridges across boundaries. In the end for patients, the added value of physicians able to cross boundaries seems to outweigh the possible challenges.

The balancing act between specialism and interdisciplinarity

> *"We need to embrace the uniqueness of each profession while cultivating an interprofessional collaboration culture in the system" (Khalili & Price, 2013)*

Alongside the balance physicians need to find at the individual level, they will also have to find balance at the group level: balancing mono- and interdisciplinarity. Traditional organization of care around the mono-disciplinary group is seen as one of the reasons why there is currently too little interdisciplinarity.[16] Consequently, to force interdisciplinary collaboration it is often suggested to dissolve the mono-disciplinary groups and organize care around patient groups. The underlying argument is that mono-disciplinary groups create boundaries between professions and may hinder collaboration. Especially as physicians are likely to protect their deeply rooted monodisciplinary group.[268,269]

Mono-disciplinary specialties have traditionally been protected professions with an elite status and an autonomous position in society and care.[35] A protected profession means that professionals themselves can create, maintain, uphold, and promote professional values and norms, characterized by expertise (specialized knowledge), autonomy (independent decision-making), and authority (setting standards).[216] This creates boundaries between professions and may hinder collaboration.

The line of reasoning that mono-disciplinary groups hinder interdisciplinarity is supported in the literature. First, physicians determine and follow specialism-specific protocols and guidelines, which gives them according to the protected profession an authoritarian position. In combination with a desire to protect their authoritarian position it can lead to conflicting approaches between physicians that substitute rather than complement each other.[16,252,270] Hence, one could argue that physicians must surrender some of their authority in inter-physician collaboration. Second, it could be argued that in terms of autonomy too, physicians must make some concessions in inter-physician collaboration. Physicians will be less able to make independent decisions when they must converge different perspectives on overlapping domains. Physicians are likely to protect their autonomy, which may lead to conflict.[216,271]

However, the monodisciplinary group does not deserve only this negative description. Instead, based on the results of our study we argue that the monodisciplinary group should be viewed as a safe haven for maintaining and developing expertise, distribution of services, education, and quality assurance. First, our research suggests that better collaboration within the mono-disciplinary group is an important foundation for better collaboration across disciplines. This can be linked to literature showing that the mono-disciplinary group can provide a source of identification which enhances a sense of belonging, wellbeing, and confidence.[16,272] Second, physicians argue that the mono-disciplinary group should be maintained for specialized knowledge. Although differing perspectives based on specialized knowledge could on the one hand hinder interdisciplinarity, it could on the other hand also lead to frictions that ultimately improve outcomes: *no pain, no gain.*[16,251]

Thus, we do not advocate dissolving medical specialties (mono-disciplinary groups). However, we are also aware that the protective behaviors of the monodisciplinary group cause that interdisciplinary collaboration has complex dynamics, easily leading to the emergence of role conflict.[252,270] Therefore, to foster interdisciplinary collaboration we suggest focus on preventing role conflict between monodisciplinary groups within interdisciplinary collaboration.[216,252]

For example, Johnson and colleagues argue that it is especially important to introduce effective interpersonal management processes to reduce role conflict and improve team performance.[252] They furthermore argue that a crucial factor in these processes is trust.[252] Noordegraaf describes that to reduce role conflict a more fundamental change in the profession is needed. He argues, with his idea of *connective professionalism,* that physicians while maintaining their distinctive expertise should view autonomy as acknowledging interdependency and relating to circumstances instead of independent decision making and gain authority by building trustworthy relationships across domains instead of by forcing their standards across domains.[216] According to these authors reducing role conflict provides the solution to facilitate interdisciplinary collaboration.

We endorse the thinking that reducing role-conflict facilitates interdisciplinary collaboration but are keen to emphasize that role conflict can arise from a great variety of sources. There can be role conflict based on shortages of resources, domain overlap, confusion about responsibility, lack of common understanding, and more. In our view, not enough is yet known about which sources of role conflict pose the biggest problems and whether different sources benefit from the same solutions.

Insights on conflict between physicians could also be relevant for the needed regional and cross-sectoral collaborations. In this too, specialized stakeholders – like monodisciplinary groups -, such as hospitals, general practitioners, and nursing homes, should find ways to connect, to ensure the delivery of optimal healthcare services. To foster optimal healthcare delivery and the associated innovation, networking across sectors and connecting with those outside the hospital is something that should also be supported. Based on our research we argue that in these collaborations as well as in interdisciplinary collaboration within the hospital between physicians it is significant to value the disciplinary variety, theoretical approaches and peculiar nature of each specialty, and honor this within collaboration.

A facilitating context: how?

As the quote at the beginning of the previous paragraph suggests, we need to work towards an interprofessional culture within the healthcare system. Physicians' intrinsic motivation to improve care seems to lead to a willingness to contribute to this, but this should also be facilitated by the system. The findings in this thesis suggest that process- and patient- oriented structures contribute to interprofessional relationships. This suggests that both quality of care and efficiency can be a basis for interdisciplinary collaboration in healthcare. However, only introducing facilitative structures within the hospital is not enough. There remains resistance among physicians to interdisciplinarity in general. As we discussed earlier, it is probably due to a sense of need to protect the valued specialism. Also, as the specialties are deeply rooted in the healthcare context (education, quality-assessment, reimbursement), which is therefore not (yet) fully aligned with interdisciplinarity. In the remainder of this paragraph, we will highlight some considered changes and their expected pitfalls, to show the high complexity in the system.

A proposed solution considered by Dutch politics is employing every physician (unlike now). The current situation, in which many independent medical specialists are united in a company that must make agreements with health insurers and the hospital on financial aspects, is considered to create the wrong incentives and cause a fixation of the existing organization and impede change.[273] Advocates of employ all physicians argue that it will lead to more like-mindedness and balance between organizational and personal goals leading to a more interprofessional culture and reduced focus on production incentives.[274] This sounds like music to the ears, but it has not yet been proven that implementing this will have the desired effect. There is even a risk of negative effects such as mutual competition, loss of efficiency, and more solo-operating physicians.[274–276]

A proposed solution in the context of medical specialties and education is suggested by the Dutch Board of Medical Specialisms. They argue that in the current system there is insufficient opportunity for coherent treatment due to far-reaching specialization which is based on treatment of complaints and pathologies within defined areas of expertise. They argue this leads to being insufficiently prepared to deal with developments in society and the interdisciplinary care demands that arise. They propose that the new norm should be *specializing in generalism, a generalist specialism as a foundation for professional practice*.[277] This should allow for better treatment of multiple conditions in a patient and reduce the need for multiple physicians to treat the patient. Instead of focusing on interdisciplinary collaboration they focus on how to change specialties to become more interdisciplinary. They argue this not only better addresses the needs of the patients, but also improves efficiency of care. For genuinely complex know-how they feel there is also still a need for some specialized physicians. This too seems like a nice solution but as mentioned earlier in the discussion, different perspectives can also have their advantages. Creating very generic physicians as the standard could potentially negate these advantages. It is therefore not surprising that, for example, the board of the FMS argue this solution as being too restrictive. They see a t-shaped professional as the norm, where the physician is generalist within its profession, with specialist knowledge to bring into the network around the patient.

The ideas and proposed changes in some areas show, in our view, an understanding of the need and willingness to change towards a more interprofessional culture. Despite this positive note, we feel the urge to underline that what we believe is the future of healthcare is preserving the unique specialisms and finding a way to develop an interdisciplinary culture, and not focusing on interdisciplinarity in extremis. This should be kept in mind in developing and changing healthcare to keep it affordable, accessible, and of quality in the future.

METHODOLOGICAL CONSIDERATIONS

The thesis research has a mixed-method design, with the combined analysis of quantitative and qualitative data. A variety of research methods were used to explore how clinical leadership and organizational changes within hospitals contribute to inter-physician collaboration. Detailed information on limitations of the individual studies is discussed in their respective chapters. Here we would like to take the opportunity to share a few more considerations that influenced our data collection but have not been discussed in detail so far.

Research in healthcare during the COVID-19 pandemic

We must acknowledge that a substantial part of research has been conducted amidst the COVID-19 pandemic. This global health crisis has burdened physicians, nurses, and the healthcare system at large with a significant workload. Consequently, the available time for research participation has been constrained. While the pandemic could have presented logistical challenges due to restricted hospital access, this was mitigated by the research's design (utilizing online surveys and interviews). Nonetheless, the pandemic may have influenced research participation and outcomes.

The pandemic has emphasized the necessity and efficacy of interdisciplinary collaboration. Various sources suggest that the uncertainty surrounding COVID-19 sparked a curiosity among healthcare professionals about each other's expertise, fostering collective cohesion and easing interdisciplinary tensions.[278–280] During times of uncertainty, physicians have demonstrated the ability to prioritize collective interests over individual ones.[280] Moreover, there are indications that interdisciplinary communication remained more accessible following the initial wave of COVID-19. This implies that the pandemic may have catalysed interdisciplinary collaboration, potentially impacting our research findings. However, the interdisciplinary collaboration we examined is not always subject to the same level of uncertainty as during the COVID-19 pandemic. Despite the potential influence on our results, our research contributes to the limited available scientific literature on interdisciplinary collaboration among physicians. Future research could explore how the conditions arising from uncertainty could be cultivated and maintained to promote and sustain interdisciplinary collaboration.

The targeted audience: physicians

Our research is driven by the lack of literature on collaboration among physicians with diverse specialties, revealing a significant knowledge gap that becomes more pertinent in light of current developments in healthcare. One potential explanation for this gap is the tendency of physicians to have low response rates, particularly for online surveys, when invited to participate in research.[281,282] Despite implementing interventions suggested in literature and receiving support from hospital management to encourage physician participation, we encountered difficulties in engaging physicians for our study.

The strategies implemented to boost participation included sending multiple reminders, distributing paper questionnaire through nursing heads, posting participations requests on the hospital's intranet, soliciting involvement during medical staff meetings, and incentivizing participation with vouchers for smoothies and a raffle of champagne bottles upon completion of the questionnaire. Furthermore, during the survey development phase, we sought guidance from experts in the hospital department responsible

for assisting researchers across disciplines in conducting scientific research. These experts advised us to keep the survey brief (maximum completion time of 10 minutes). Their insights revealed that lengthy surveys among physicians tend to yield minimal responses, primarily due to "survey fatigue" caused by multiple survey requests. Additionally, feedback from physicians during the pilot survey emphasized the importance of brevity, with one physician highlighting the challenges of obtaining responses even for mandatory surveys issued by professional societies. These insights led us to prioritize a concise survey design while ensuring methodological rigor.

Despite our best efforts, we acknowledge the limited size, emphasizing the need necessity for more extensive research involving a larger number of participants. This is crucial for attaining a deeper understanding and incorporating confounding factors into analyses. Presenting an exciting challenge for future research.

Generalization

Apart from the systematic review, our research is situated within the Dutch healthcare sector. While there are resemblances to international trends observed in hospital designs, there are also distinctions that render the Dutch context unique. For instance, Dutch physicians hold a relatively robust and distinctive autonomous position in healthcare compared to their counterparts in other counties.[35] It may therefore be that in the Netherlands physicians' influence on changes, also around structures, is greater than in other countries. Consequently, it is plausible that in the Netherlands, physicians wield greater influence over changes, including structural modifications.

Furthermore, apart from the study on the development of design in the Netherlands (chapter 2), the remainder of our research is centered on a single hospital. Despite shared developments internationally and nationally in hospitals, such as the introduction of process-based designs, the article on hospital design development in the Netherlands suggests variations among hospitals based on factors like organizational culture and strength of the board's vision. We endeavored to convey both the context and the commonalities in our research. While achieving a direct translation may not be feasible, we believe that our research offers insights for discussions on restructuring, clinical leadership, and collaboration among physicians from diverse specialties.

IN CONCLUSION

A balance between specialization and interdisciplinarity is essential for improving healthcare. While interdisciplinary collaboration is necessary for comprehensive and efficient patient care, the existence of monodisciplinary specialisms must be preserved as a stable foundation for collaboration. Additionally, the role of clinical leadership is crucial, with physicians needing to combine both professional and managerial skills to promote effective collaboration across different specialisms. This balance needs to be found at the individual, group, and hospital levels. Despite the challenges of hybrid roles and potential conflicts, the benefits of interdisciplinary collaboration are evident, especially in a system that recognizes and values the unique contributions of specialisms and the importance of interprofessional relationships.

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SUMMARY

Hospitals have historically developed based on a single-disease paradigm, with departments and physicians focusing on and specializing in specific medical fields. This has led to fragmentation in healthcare, making current hospital care less suited to the needs of patients with multimorbidity. These complex patients require medical knowledge from multiple disciplines, necessitating collaboration between physicians across specialties. Hospital structures should facilitate such collaboration, and physicians, as key agents of change, must take the lead in fostering collaboration beyond boundaries of specialty. The aim of this thesis is to explore how physicians, in their role as clinical leader, and organizational changes within hospitals contribute to collaboration between medical specialties.

The research presented in chapter 2 used a qualitative approach to explore how hospital designs are evolving and what the key drivers of change are. First, hospital organizational charts and annual reports revealed that hospital designs in the Netherlands have three types of building blocks: units, clusters, and centers. Units are built around specific medical specialties. Clusters are basically umbrellas under which different medical specialties share resources but still have a lot of autonomy. Centers are multi-specialty entities that are often built around patient conditions and do not have specialty units within them. Analysis of the interviews revealed that hospitals are slowly moving towards hybrid designs, using combinations of building blocks and design logics. Institutional pressures from the health care sector and mimicking others are the main drivers for change. However, they are all following a specific path that depends on their heritage. Overall, hospital structures were found to be the result of incremental, path-dependent decisions rather than grand redesigns. The findings in this chapter suggest that most hospitals support collaboration through incremental changes in their structure.

Although collaboration between medical specialties is necessary, the literature has often studied physicians as a single unified group or has studied only a specific group of physicians. Based on a scientific review of the literature, chapter 3 presents the state of the academic literature on collaboration between physicians from different medical specialties in a hospital setting. Based on 63 articles we learned that many factors influence collaboration between medical specialties. We identified a very diverse set of tools used to measure collaboration, often newly developed for each specific study. And we showed that good collaboration between physicians show promise for improving quality of care, increasing patient and employee satisfaction and reducing hospitalization costs. The study confirmed that there are important differences between medical specialties. It suggested the importance of better understanding the underlying patterns in collaboration between specialists in order to improve collaboration.

Chapter 4 presents research that examined the clinical leadership roles of physicians and nurses in a hospital context and how these roles relate to their collaborative behaviors. Based on scores by 100 physicians and 329 nurses on a clinical leadership scale, it is suggested that both nurses and physicians can be clinical leaders. That is, they are both directly involved in clinical care while striving to improve care and motivating others to do the same. However, the results showed that nurses were less likely than physicians to perceive themselves as clinical leaders. Physicians who demonstrate clinical leadership behaviors are more likely to express collaborative behaviors and report higher job satisfaction. Nurses who exhibit clinical leadership behaviors are also more likely to express collaborative behaviors, but did not report higher job satisfaction. In the discussion, we presented the idea that nurses from their non-dominant position use more non-confrontational strategies to exert influence. It is suggested that this is helpful in working with physicians, but healthcare may require a more dominant group of nurses. Nurses are the ones who have the most intensive and direct involvement with patients and can best advocate for their needs. To convince and encourage other healthcare professionals to change, they need more dominant strategies.

The need for collaboration between physicians does not seem to be in question, but rather how to achieve it in daily practice. In chapter 5, we therefore extended the research to explain the relationship between physician clinical leadership and outcomes in termsof job satisfaction and quality of care. The focus was on the mediating role of collaboration between physicians of the same medical specialty and between physicians in different specialties. Survey responses indicated that clinical leadership was associated with greater job satisfaction through better collaborative relationships within the medical specialty group, through better collaborative relationships across specialties, and sequentially through both types of collaborative relationships. Only the collaborative relationship within the medical specialty group, and not the collaborative relationship across specialties was relevant to quality of care. The chapter suggests that physician clinical leadership should be strived for to improve day-to-day practice. It also suggests that the medical specialty group is important for collaboration beyond boundaries of specialty. Therefore, we cannot give a conclusive answer as to whether care should be organized exclusively around medical specialty groups or multidisciplinary units.

To further explore the impact of the introduction of multidisciplinary units, in chapter 6 we answered the question of whether the introduction of patient-oriented units (based on shared patient groups, focusing on care pathways) and process-oriented units (based on similar processes, focusing on efficiency) as part of a process-based design led to multidisciplinary collaboration and had a positive impact on health care in terms of efficiency, innovation, and effectiveness. We also examined whether this differed between

the two types of units. The results, that were based on quantitative and qualitative responses to survey questions at two points in time, showed positive effects for both types of units. Physicians in patient-oriented units were more likely to perceive benefits from structural changes. It has been suggested that this may be because better care is the focus of physicians, and in patient-oriented units the impact of multidisciplinary collaboration on care of complex patients is more apparent. In addition to answering the question, the qualitative results of the study again showed, that despite the need for collaboration across specialties, there is still an important role for the medical specialty group in terms of education and training.

Chapter 7 described and discussed the main findings of this thesis. Reflecting on these findings the discussion explored the balance between specialization and interdisciplinarity in modern healthcare, resulting in call for a balanced approach that preserves the strength of monodisciplinary expertise while fostering an interprofessional culture. In addition, this chapter presented the methodological considerations including the impact of the COVID-19 pandemic, challenges to physician participation, and generalizability, accompanied by recommendations for future research.

This thesis has shown that collaboration beyond specialty boundaries, balanced with specialization, is essential to improving health care. It provided a first insight into the role of hospital structures and physician leadership in future health care. It emphasizes that future health care reforms should carefully balance specialization and interdisciplinarity at the level of the physician, the medical specialty group, and the hospital.

SAMENVATTING

Ziekenhuizen zijn primair ontwikkeld op basis van specialismen, met afdelingen en artsen die zich richten op en specialiseren in een specifiek medisch gebied. Dit heeft echter deels geleid tot fragmentatie in de gezondheidszorg. Daardoor sluit de huidige ziekenhuiszorg niet altijd goed aan bij de behoeften van patiënten met meerdere aandoeningen, een groep die door de vergrijzing steeds groter wordt. Voor deze complexe patiënten is medische kennis van verschillende disciplines nodig, wat samenwerking vereist tussen artsen van verschillende medische specialismen. Ziekenhuizen zouden hun structuur en organisatie zo moeten inrichten dat samenwerking tussen specialismen wordt ondersteund. Daarnaast is het aan artsen om het voortouw te nemen in veranderingen die samenwerking over de grenzen van het specialismen heen mogelijk maken. Het doel van dit proefschrift is om beter te begrijpen hoe artsen als klinisch leiders en organisatorische veranderingen binnen ziekenhuizen bijdragen aan de samenwerking tussen artsen van verschillende medische specialismen.

Het onderzoek in hoofdstuk 2 richt zich met een kwalitatieve aanpak op hoe ziekenhuisontwerpen zich ontwikkelen en de belangrijkste drijfveren voor verandering. Op basis van organogrammen en jaarverslagen van Nederlandse ziekenhuizen blijkt dat ziekenhuisontwerpen drie soorten bouwstenen kennen: units, clusters en centra. Units zijn gebaseerd op specifieke medische specialismen. Binnen clusters groeperen meerdere medische specialismen om middelen te delen en beslissingen te centraliseren. Centra zijn multispecialistische eenheden rond patiëntgroepen, waarbij medisch specialistische afdelingen zoveel mogelijk worden losgelaten. Uit interviews blijkt dat ziekenhuizen zich langzaam ontwikkelen naar hybride ontwerpen, waarin verschillende van deze bouwstenen en achterliggende logica's gecombineerd worden. Institutionele druk vanuit de gezondheidszorg en geïnspireerd worden door andere ziekenhuizen zijn de belangrijkste drijfveren voor verandering. Echter, elk ziekenhuis kiest een eigen pad, afhankelijk van eigen historische ontwikkelingen. Over het algemeen blijkt dat ziekenhuisstructuren eerder het resultaat zijn van incrementele, ziekenhuis-specifieke keuzes dan van grootschalige herontwerpen. De bevindingen van dit hoofdstuk tonen dat de meeste ziekenhuizen samenwerking ondersteunen door het doorvoeren van incrementele veranderingen in hun structuur.

Hoewel samenwerking tussen medische specialismen noodzakelijk is, wordt in de wetenschappelijke literatuur vaak naar artsen als één homogene groep gekeken of slechts naar specifieke specialismen. Op basis van een wetenschappelijke literatuurstudie biedt hoofdstuk 3 een overzicht van de academische literatuur over samenwerking tussen artsen van verschillende medische specialismen in een ziekenhuissetting. Op basis van 63 artikelen blijkt dat diverse factoren de samenwerking tussen medische specialismen beïnvloeden.

Daarnaast blijkt dat een zeer diverse reeks instrumenten gebruikt wordt om samenwerking te meten, vaak slechts in één enkele studie. De resultaten laten zien dat goede samenwerking tussen artsen over de grenzen van het specialisme heen veelbelovend is voor een betere zorgkwaliteit, hogere tevredenheid van patiënten en medewerkers, lagere ziekenhuiskosten, en een kortere opnameduur. Ook bevestigt dit hoofdstuk dat er significante verschillen zijn tussen medische specialismen. Dit onderstreept het belang om onderliggende patronen in samenwerking tussen specialismen beter te begrijpen om samenwerking te verbeteren.

Hoofdstuk 4 presenteert onderzoek naar de klinische leiderschapsrol van artsen en verpleegkundigen binnen een ziekenhuiscontext en hoe deze rol samenhangt met hun samenwerkingsgedrag. Op basis van scores van 100 artsen en 329 verpleegkundigen op een schaal voor klinisch leiderschap blijkt dat zowel verpleegkundigen als artsen klinisch leiders kunnen zijn. Dit houdt in dat zij direct betrokken zijn bij de klinische zorg, zich inspannen om de zorg te verbeteren en anderen motiveren om hetzelfde te doen. Toch toonden de resultaten aan dat verpleegkundigen zichzelf minder als klinisch leiders beschouwen dan artsen.

Artsen die klinisch leiderschap vertonen, vertonen vaker samenwerkingsgedrag en zijn meer tevreden over hun werk. Verpleegkundigen die klinisch leiderschap vertonen zijn ook meer geneigd om samenwerkend gedrag te vertonen, maar rapporteren geen hogere werktevredenheid. In de discussie is besproken dat een mogelijke verklaring is dat verpleegkundigen vanwege hun minder dominante positie vaker niet-confronterende strategieën gebruiken om invloed uit te oefenen, waardoor ze een goede samenwerking met artsen behouden. De gezondheidszorg zou echter kunnen profiteren van een meer dominante rol van verpleegkundigen. Verpleegkundigen zijn degenen die het meest intensief en direct contact hebben met patiënten en kunnen hun behoeften vertalen naar plannen voor betere zorg. Maar om andere zorgverleners te overtuigen en te motiveren om te veranderen hebben verpleegkundigen meer dominante strategieën nodig.

De noodzaak van samenwerking tussen specialismen lijkt niet ter discussie te staan, wel hoe dit in de dagelijkse praktijk bereikt kan worden. Het vijfde hoofdstuk richt zich daarom op de relatie tussen klinisch leiderschap van artsen en uitkomsten in termen van werktevredenheid en kwaliteit van zorg, met een mediërende rol van samenwerking tussen artsen van hetzelfde medische specialisme en van verschillende specialismen. De resultaten tonen aan dat klinisch leiderschap gerelateerd was aan meer tevreden zijn met het werk door betere samenwerkingsrelaties binnen de groep van medisch specialisten, door betere samenwerkingsrelaties over de grenzen van het specialisme heen, en achtereenvolgens door beide soorten samenwerkingsrelaties.

Alleen de samenwerkingsrelatie binnen de medisch-specialistische groep, en niet de samenwerkingsrelatie buiten de grenzen van het specialisme was relevant voor de kwaliteit van zorg. Verondersteld wordt dat klinisch leiderschap door artsen moet worden nagestreefd om de dagelijkse praktijk te verbeteren. Verder is het aannemelijk dat de medisch-specialistische groep van belang is voor samenwerking over de grenzen heen. We kunnen daarom geen sluitend antwoord geven op de vraag of de zorg uitsluitend georganiseerd zou moeten worden rond medisch-specialistische groepen of multidisciplinaire eenheden, maar pleiten voor een hybride vorm.

Om dieper in te gaan op het effect van de introductie van multidisciplinaire eenheden, beantwoorden we in hoofdstuk 6 de vraag of de introductie van patiëntgerichte eenheden (gebaseerd op gedeelde patiëntgroepen, focus op zorgtrajecten) en procesgerichte eenheden (gebaseerd op vergelijkbare processen, focus op efficiëntie) als onderdeel van een procesmatig ontwerp leidt tot multidisciplinaire samenwerking en een positief effect heeft op de gezondheidszorg in termen van efficiëntie, innovatie en effectiviteit. Daarnaast onderzochten we of dit verschilde tussen de twee typen eenheden. De resultaten, gebaseerd op kwantitatieve en kwalitatieve antwoorden op enquêtevragen op twee tijdstippen tonen positieve effecten voor beide eenheden.

Vooral artsen in patiëntgerichte eenheden zagen voordelen in structurele veranderingen. Dit komt mogelijk doordat betere zorg de focus van artsen is en binnen patiëntgerichte eenheden de impact van multidisciplinaire samenwerking op multidisciplinaire zorg voor complexe patiënten beter merkbaar is dan binnen procesgerichte eenheden. Daarnaast bevestigen de kwalitatieve resultaten dat, ondanks de behoefte aan samenwerking over de grenzen van het specialisme heen, de medisch specialistische groep een belangrijke rol blijft spelen op het gebied van onderwijs en opleiding.

Hoofdstuk 7 beschrijft en bespreekt de belangrijkste bevindingen van dit proefschrift. Reflecterend op deze bevindingen wordt in de discussie de balans tussen specialisatie en interdisciplinariteit in de moderne gezondheidszorg belicht. Dit leidt tot een pleidooi voor een evenwichtige benadering die zowel de kracht van monodisciplinaire expertise behoudt en een interprofessionele cultuur bevordert. Daarnaast worden in dit hoofdstuk de methodologische overwegingen gepresenteerd, waaronder de impact van de COVID-19 pandemie, de uitdagingen rondom deelname van artsen en de generaliseerbaarheid van de resultaten, gevolgd door aanbevelingen voor toekomstig onderzoek.

Dit proefschrift concludeert dat samenwerking over de grenzen van specialismen heen, in balans met specialisatie, essentieel is voor het verbeteren van de gezondheidszorg. Het biedt een eerste inzicht in de rol van ziekenhuisstructuren en het leiderschap van artsen hierin voor de toekomstige gezondheidszorg. Het benadrukt dat toekomstige hervormingen in de gezondheidszorg een zorgvuldige balans moeten vinden tussen specialisatie en interdisciplinariteit op het niveau van de arts, het medisch specialisme en het ziekenhuis.

DANKWOORD & PORTFOLIO

DANKWOORD

Je werkt keihard aan je wetenschappelijke publicaties, zwoegt om ze te bundelen in een proefschrift, en dan hoor je van zeer betrouwbare bronnen dat het meest gelezen onderdeel van dat proefschrift… het dankwoord is. Gelukkig biedt dit een mooie mogelijkheid om dankbaar te zijn voor de mensen die hebben geholpen om het proefschrift tot stand te brengen. Wat voor mij nog belangrijker is: het biedt ook ruimte om dankbaar te zijn voor degenen die misschien alleen het dankwoord lezen, maar des te belangrijker zijn voor de balans tussen proefschrift en privé en voor de dingen die het leven écht leuk maken.

Samenwerking over de grenzen van het specialisme heen staat centraal in het proefschrift, maar heeft ook bijgedragen aan het tot stand komen van mijn proefschrift door het samenkomen van verschillende achtergronden en perspectieven binnen mijn promotieteam. Carina, met jouw medische achtergrond en managementfunctie in de zorg wist je een waardevolle bijdrage te leveren en de discussies tot leven te brengen. Martina, jij die met jouw loopbaan bij de faculteit, kennis over kwantitatief onderzoek, en structuur een heel waardevolle bijdrage hebt geleverd. Jeroen, jij de chaoot, de creatieveling met wie ik soms misschien moest zoeken naar hoe we elkaar konden begrijpen, maar van wie ik ook heb geleerd dat er meer is dan alleen werk en ambitie. Jeroen en Martina, eigenlijk kan ik jullie niet los van elkaar bedanken. Jullie zijn in mijn ogen twee tegenpolen die juist daardoor een fantastisch begeleidings-duo vormen! Bedankt voor alles.

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Helaas kan ik niet ontkennen dat een groot gedeelte van mijn PhD ook is getekend door de aanwezigheid van COVID. Waar ik in het begin vrijwel iedere dag in Rotterdam te vinden was, heb ik tijdens en na het verplicht thuiswerken, vooral de eettafel gezien als werkplek. Gelukkig met vrienden en vriendinnen als ontzettend waardevolle collega-thuiswerkers! Enkele leuke herinneringen met mijn échte EUR-collega's blijven me bij: onder andere een padel-clinic met de afdeling (hulde aan Marike!), obstakelrun

door de modder, en niet te vergeten de culinaire schrijfcursus met alle mede PhD'ers. Opvallend? Het waren vooral de sportactiviteiten en lekker eten die het voor mij tot een onvergetelijke tijd hebben gemaakt. Iedereen die daarbij aanwezig was, bedankt voor de gezelligheid.

Ik wil al mijn lieve vriendinnen en vrienden bedanken voor hun onvoorwaardelijke steun in de afgelopen jaren. De meesten van jullie hebben al deze jaren meegeleefd met grote gebaren, kleine attente vragen, het motiveren, en vooral ook het gewoon er zijn. Veel van jullie hebben mij de afgelopen jaren zien worstelen. Maar zoals het een echte Zeeuwse betaamt: *Ik worstel, en kom boven!* De steun die ik van jullie heb ervaren was er in vele vormen: inhoudelijke discussies, adviezen, interesse tonen in, geklaag aanhoren, het vieren van publicaties, samen gieren van het lachen, samen sporten, samen genieten van eten, samen borrelen ("*als er maar salmiak is!*"), spelletjes spelen, samen puzzelen, samen wandelen, samen een work-away doen, vakanties, samen series of slechte films kijken, en ga zo maar door. Jullie staan altijd voor mij klaar en kennen mij door en door. Ik ben ontzettend blij met en dankbaar voor jullie in mijn leven!

Naarmate ik ouder word en dus naarmate mijn PhD vorderde (want het heeft even geduurd) ben ik dit allemaal nog meer gaan waarderen. Helemaal omdat ik weet dat jullie ontzettend trots zijn. Tot slot ben ik blij dat ik twee van jullie als paranimf aan mijn zijde heb.

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Hora Est!

PHD PORTFOLIO

Name	Anoek Braam
Department	Health Services Management & Organization
Faculty	Erasmus School of Health Policy and Management
PhD period	2019-2024
Promotor	Prof.dr. Carina Hilders
Copromotors	Dr. Martina Buljac-Samardžić
	Dr. Jeroen van Wijngaarden

Courses

How to finish your PhD in time	2019
Doing ethnography	2019
Quantitative data collection with a questionnaire	2019
Principles of Research in Medicine and Epidemiology	2019
Advances in Clinical Epidemiology	2019
Regression analysis	2019
Causal mediation analysis	2019
Multilevel modelling I: an introduction	2020
Multilevel modelling II: multilevel structural equation modelling (SEM)	2020
Shut up and write!	2020
Coaching	2020
Basic didactics	2020
Group dynamics	2020
Qualitative coding with Atlas.ti	2021
Clinical Epidemiology	2021

Conferences

Attendance Congress “Netwerkgeneeskunde: De medisch specialist met één been buiten het ziekenhuis”.	2019
Presentation and attendance European Health Management Association Conference (digital). “The effect of theme-based restructuring of a hospital on collaboration between physicians”.	2020
Presentation and attendance (digital) at International Conference on Integrated Care. “Inter-physician collaboration in hospitals”.	2022
Presentation and attendance European Health Management Association Conference. “Importance of clinical leadership in crossing medical specialist boundaries”.	2022

Teaching activities

Bachelor – Thesis Supervision old style	2019
Bachelor Management van Zorgorganisaties – Workgroups	2019
Bachelor – Thesis supervision new style	2020
Bachelor Zorgen voor Later – Supervision Kwantitatief Leeronderzoek	2021 - 2023
Bachelor – Intervision Supervision	2020 – 2023
Pre- Master – Supervision Kwantitatief Leeronderzoek	2022
Master HCM – Organisational Behavior (Exam review)	2020 - 2023
Master HCM – Financial Management (Exam review)	2020 - 2023
Master HCM – Internship (support staff)	2019 – 2020
	2022 – 2023

Additional activities

Executive Workshop Physicians as Leaders by the European Health Management Association	2022
Peer reviewer Health Care Management Review	2023

International Publications

Anoek Braam, Jeroen van Wijngaarden, Carina Hilders & Martina Buljac- Samardžić (2024). Multidisciplinary collaboration in hospitals via patient- and process-oriented units: a longitudinal study. Journal of Multidisciplinary Healthcare.

doi: 10.2147/JMDH.S454903

Anoek Braam, Martina Buljac- Samardžić, Carina Hilders & Jeroen van Wijngaarden (2023). Similarities and differences between nurses' and physicians' clinical leadership behaviours: a quantitative cross-sectional study. Journal of Nursing Management.

doi: 10.1155/2023/8838375

Anoek Braam, Jeroen van Wijngaarden, Manja Vollmann, Carina Hilders, & Martina Buljac- Samardžić (2023). Clinical leaders crossing boundaries: a study on the role of clinical leadership in crossing boundaries between specialties. PloS ONE.

doi: 10.1371/journal.pone.0294264

Jeroen van Wijngaarden, Anoek Braam, Martina Buljac- Samardžić & Carina Hilders (2023). Towards process-oriented hospital structures: drivers behind the development of hospital designs. International Journal of Environmental Research and Public Health.

doi: 10.3390/ijerph20031993

Anoek Braam, Martina Buljac- Samardžić, Carina Hilders & Jeroen van Wijngaarden (2022). Collaboration between physicians from different medical specialties in hospital settings: a systematic review. Journal of Multidisciplinary Healthcare.

doi: 10.2147/JMDH.S376927

ABOUT THE AUTHOR

Anoek Braam was born in Goes on the 25th of February 1992. She studied Finance and Control at the applied university Avans in Breda. She continued her education at Leiden University and obtained a research master's degree in Social and Organizational Psychology. After gradution, Anoek started her PhD trajectory at the health services management & organisation department at the Erasmus School of Health Policy & Management, which resulted in this thesis. The results of her PhD research were published in international journals and presented at international conferences. Next to conducting research, she thaught various courses. Currently, she works as a researcher at 113 Zelfmoordpreventie, the Dutch organization for suicide prevention.

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